NEW EXPERIMENTS UPON VIPERS.

WITH

EXQUISITE REMEDIES,

That may be drawn from them, as well for the *Cure* of their *Bitings*, as for that of other Maladies.

Also a LETTER of

FRANCISCO REDI,

Concerning some Objections made upon his Observations about *VIPERS*:

Written to

Monsieur *BOURDELOT*

AND

Mr. *ALEX. MORUS.*

Together with the Sequel of New Experiments upon Vipers, in a Reply to a Letter written by

Sign. *F. REDI.*

By *M. CHARAS.*

Now rendred English.

LONDON,

Printed for *J. Martyn*, Printer to the *R. Society*, at the Bell in St. *Pauls* Church-yard, 1673.

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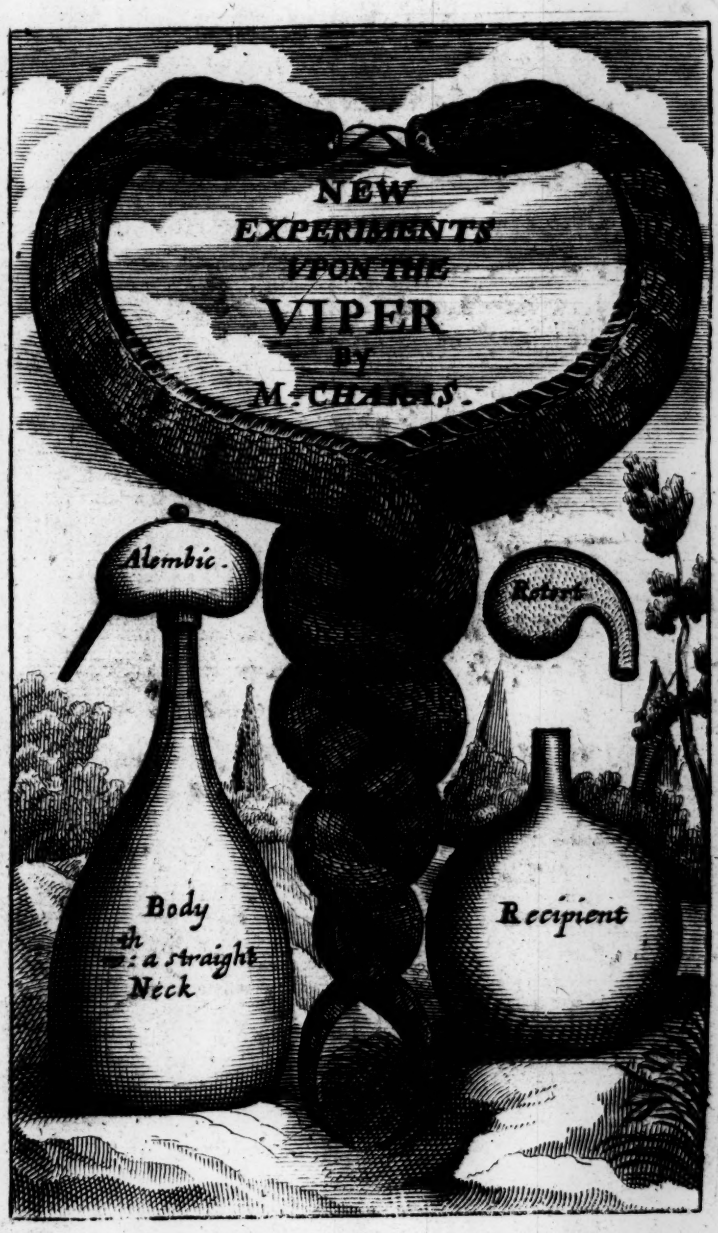
NEW
EXPERIMENTS
VPON THE
VIPER
BY
M. CHARAS.
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Retort.
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: a straight
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Jos: Banks

THE Preface.

MAny will perhaps wonder, that after ſo many famous Authours, Antient and Modern, who have written of VIPERS, *I ſhould yet undertake to labour in an Argument, which in all likelihood they ſhould have exhauſted. But if reflexion be made on the many wonders, that are found in the Body of this Animal, it will be eaſily granted, that it cannot be inquir'd into with too much exactneſs, and that it is not a work, that can be finiſh't at one or two ſittings.*

What Obſervations have been left us by knowing men, although they be not carried to their perfection, may be very uſeful to thoſe, that are come after them, to make them diſcover what had eſcaped their diligence. And without this aid, I ſhould not have had the

confidence of undertaking this Work; in which I have propos'd to my ſelf three main things, that may much contribute to the illuſtration of the Hiſtory concerning Vipers. The firſt is, to examine ſundry Obſervations of the Antients, which have hitherto paſs'd for true, though moſt of them are not ſo. The ſecond, to give an accompt of other Obſervations, which have been unknown to our Predeceſſors. The third, to find in the Viper, which cauſeth ſo many miſchiefs, Specifick Remedies againſt its Biting, which had not been diſcover'd before, and may ſerve to overcome many troubleſom Diſtempers, which the ordinary Remedies were not able to conquer.

The Enterpriſe, certainly, is bold; and, I confeſs, I ſhould never have compaſs'd it, what hope ſoever I might have conceived of it, had I not been aſſiſted by ſome knowing Phyſitians, whoſe light hath been very helpful to me.

Their Modeſty permits not, I ſhould here name them; it ſufficeth the Publick to know, that a good part of the rare things in this Treatiſe is due to them. They had the kindneſs to meet often at my Houſe for the ſpace of three months, and there to ſee

made

made exact Diſſections of Vipers, *which by my care were brought to me from all Parts of this Kingdome; and to ſee alſo Experiments tryed of their biting, upon divers Animals, and to examine their Bodies, immediately open'd after their death, to diſcover the true cauſe of it; and to preſcribe Remedies, anſwerable to their Conjectures, and to take notice of the ſucceſs of the ſame.*

In diſſecting all theſe Vipers, *we were willing to ſee the parts, which Authors have taken notice of, and which have alſo been repreſented in the Books of ſome of them: And comparing them with the Natural ones, that were before our Eyes, we found great omiſsions of very conſiderable parts; an introduction of ſome imaginary ones, and repreſentations and ſcituations of ſeveral that were ill deſigned, and ill enough placed. It was thought fit, I ſhould endeavour to perform ſomething more accompliſht: And Monſieur* Boſſe, *whoſe skill and dexterity in the Art of Deſigning and Graving is known and eſteem'd of all the World, in things of a farr ſublimer nature than the Anatomy of* Vipers, *being happily preſent at one of our meetings, and taking great pleaſure to oblige*

his Friends, expreſſed from that very time, that he was very willing to ſecond my intentions: And having received from me a ſufficient number of Subjects, hath taken the pains to deſign them after the life, and thereupon to grave all the conſiderable parts of this Animal. In a word, I have omitted nothing of what might render my Deſign anſwerable to the wiſhes of all Learned and Curious men.

Now as thoſe, who, ſpeaking of a matter that hath been often handled by others, cannot but muſt often repeat again, what hath been already ſaid of it; I thought, I was not to ſcruple to enlarge my ſelf a little, that I might not give an imperfect Anatomy of the Viper, *of which it was fit enough to deſcribe as well the great number of the true parts, that have been known to our Anceſtors, as the new ones, by me found after them.*

I ſay nothing of my way of Writing. From a perſon of my profeſſion, you are not to expect the Elegancy and Purity of our Tongue. I thought it enough for me, to deliver my ſelf clearly and intelligibly, which is, in my opinion, all that could be expected from me.

For the rest, I think, I am the first, that hath given to France *a* Treatise *of the* Viper *in its Native Language. Those who understand no other Languages, may think themselves obliged by it, in regard they would else have been ignorant of abundance of things, that deserve to be known.* Farewell.

THE

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FIMIS.

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PAge 13. line 6. read *seen on.* p. 29. l. 8. r. *and that.* p. 95. l. 27. r. *and the want of goodneſs.* p. 120. l. 5. r. *the bitten animal would be.* p. 126. l. 12. r. *twice through,* for, *twice in the day-light.* p. 163. l. 12. r. *adapt.* p. 165. l. 1. r. *with Salt and Dill.* p. 172. l. 1. r. *Simples be in.*

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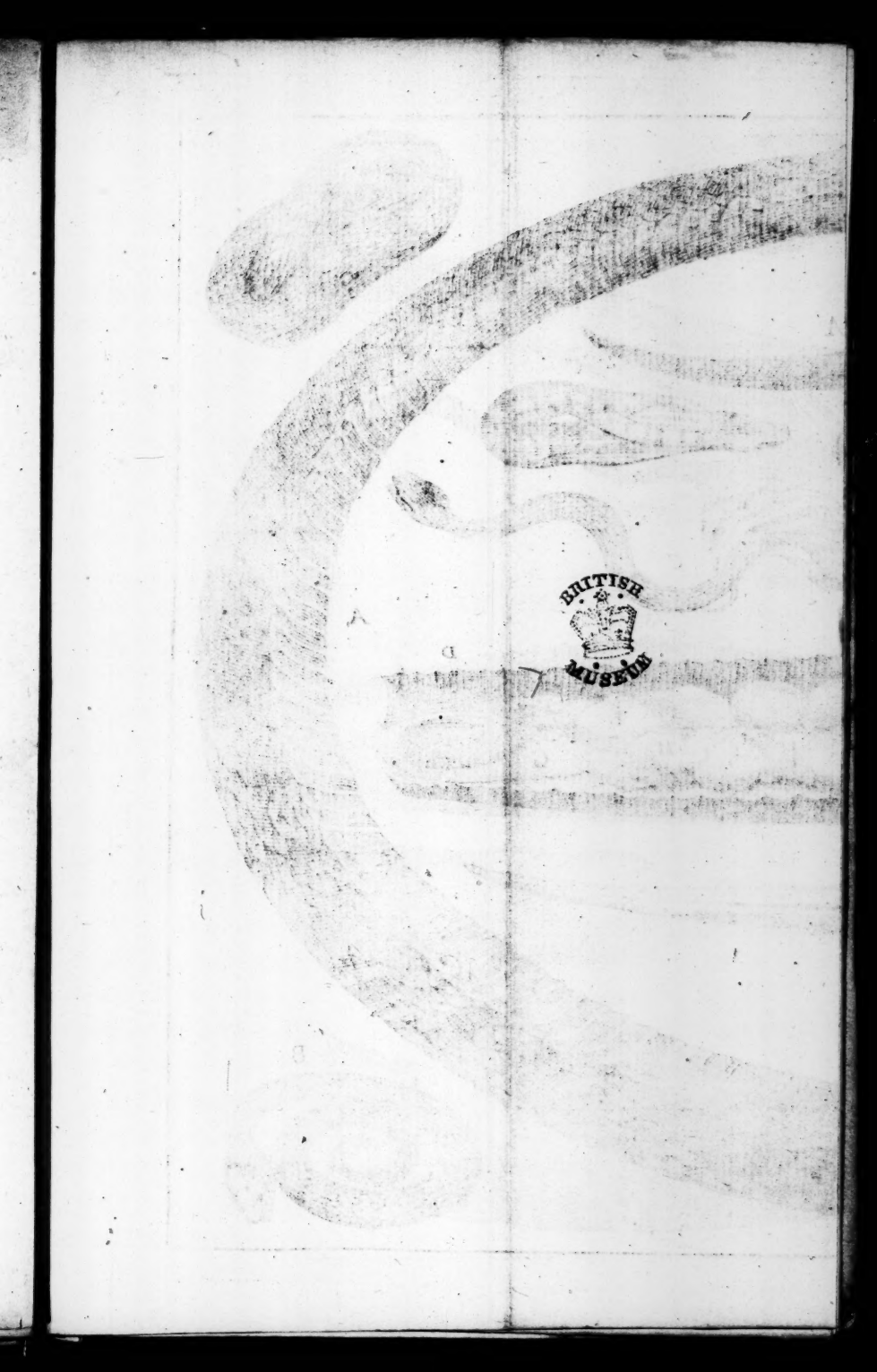
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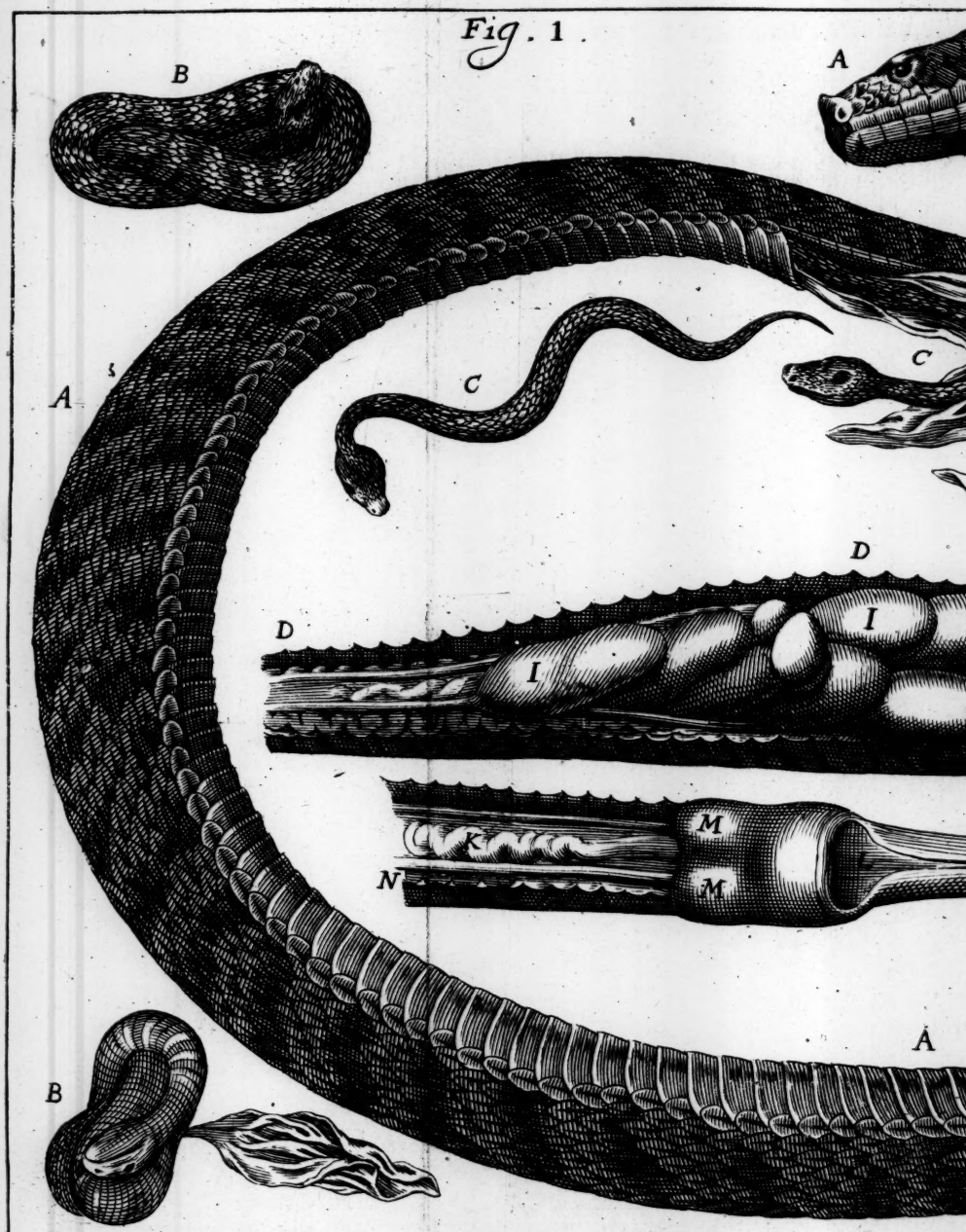
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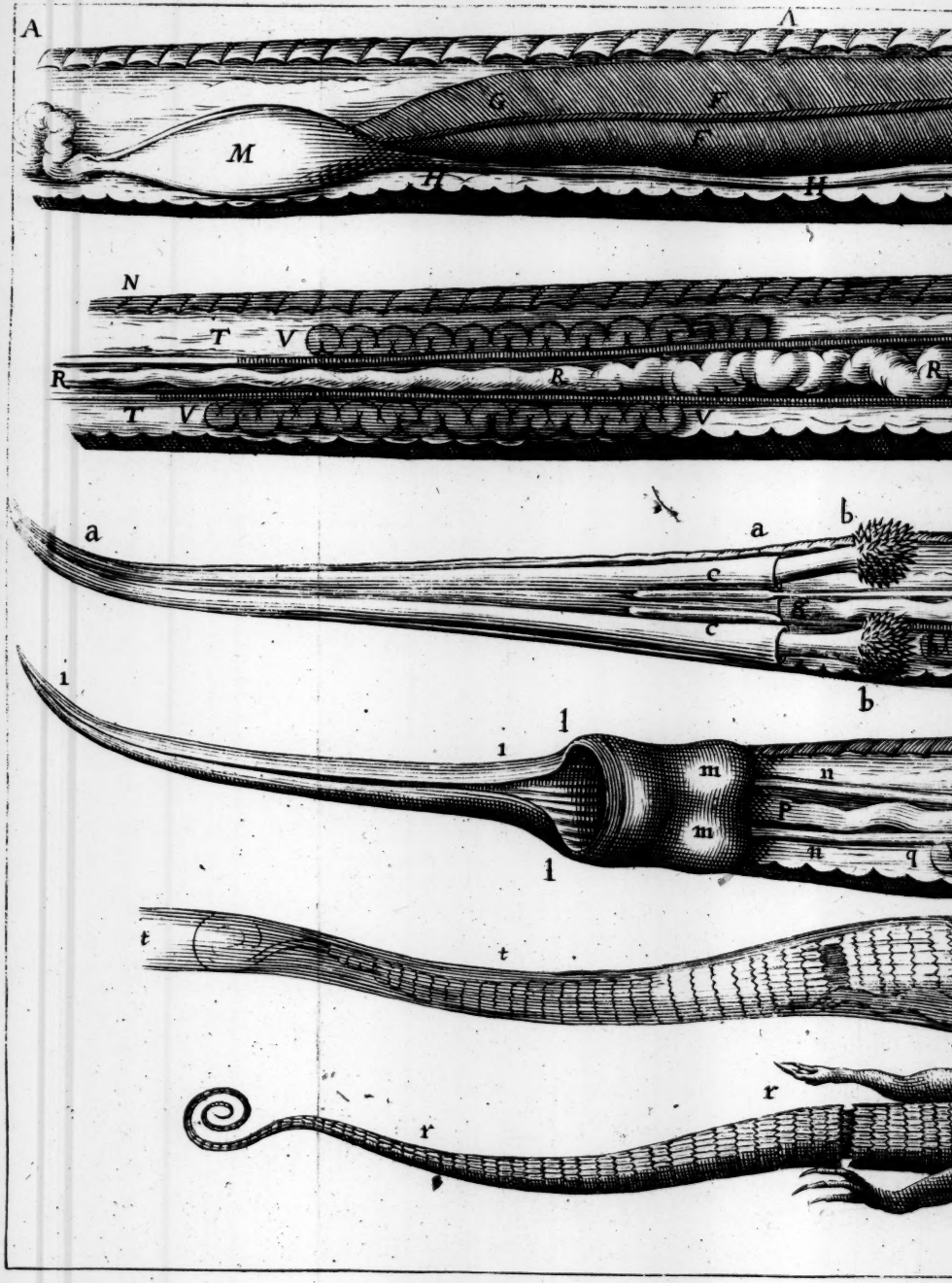
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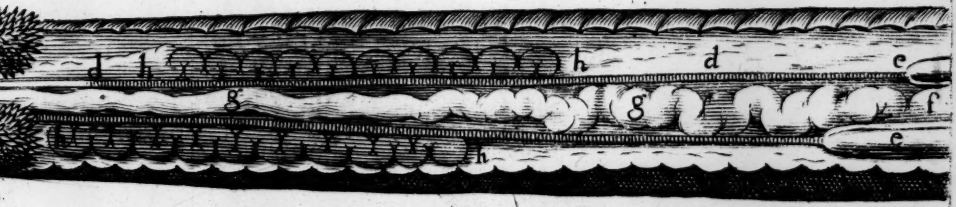

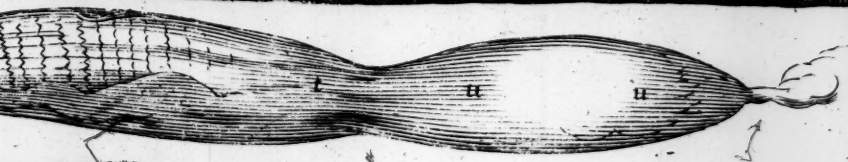

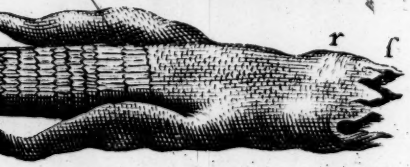

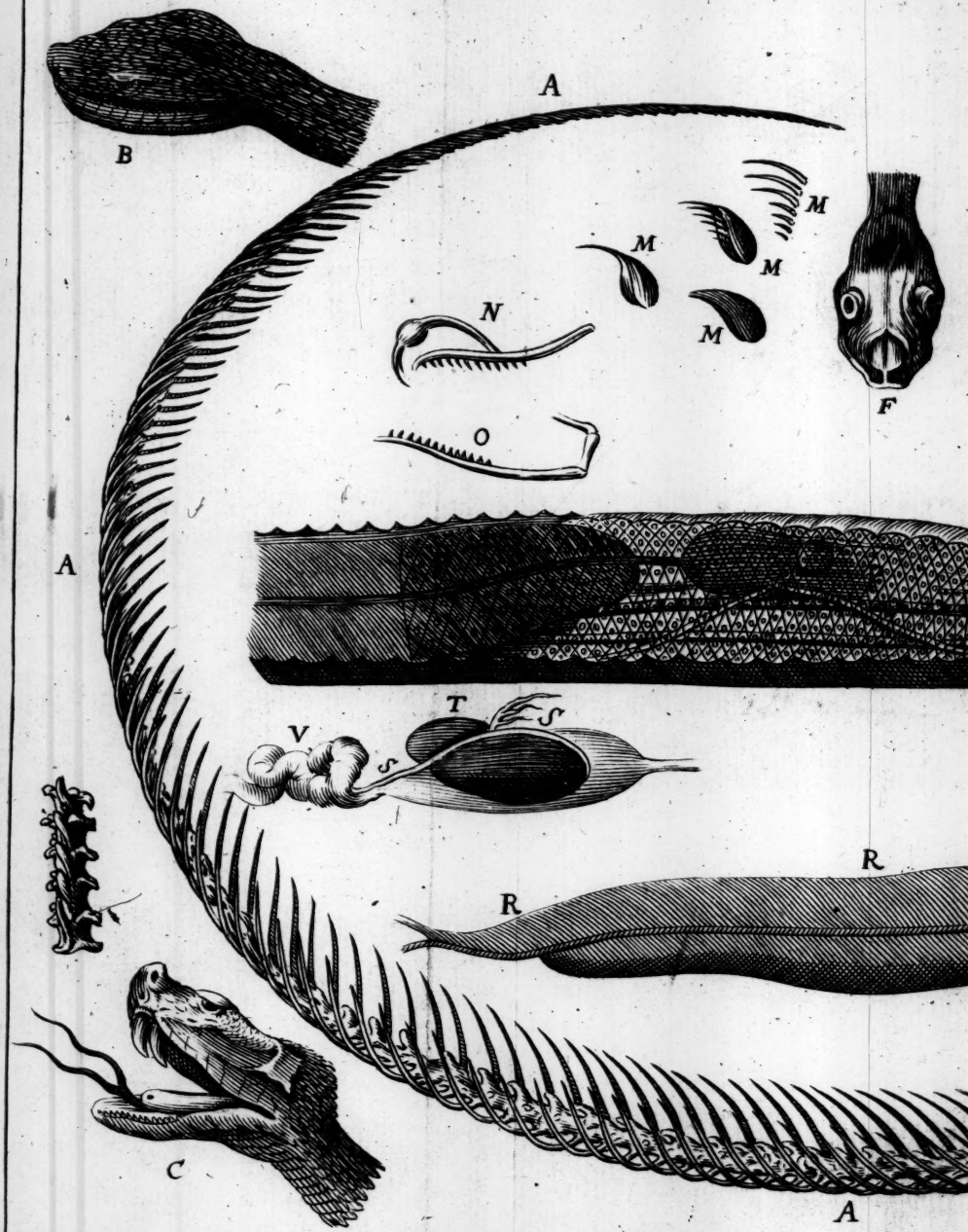
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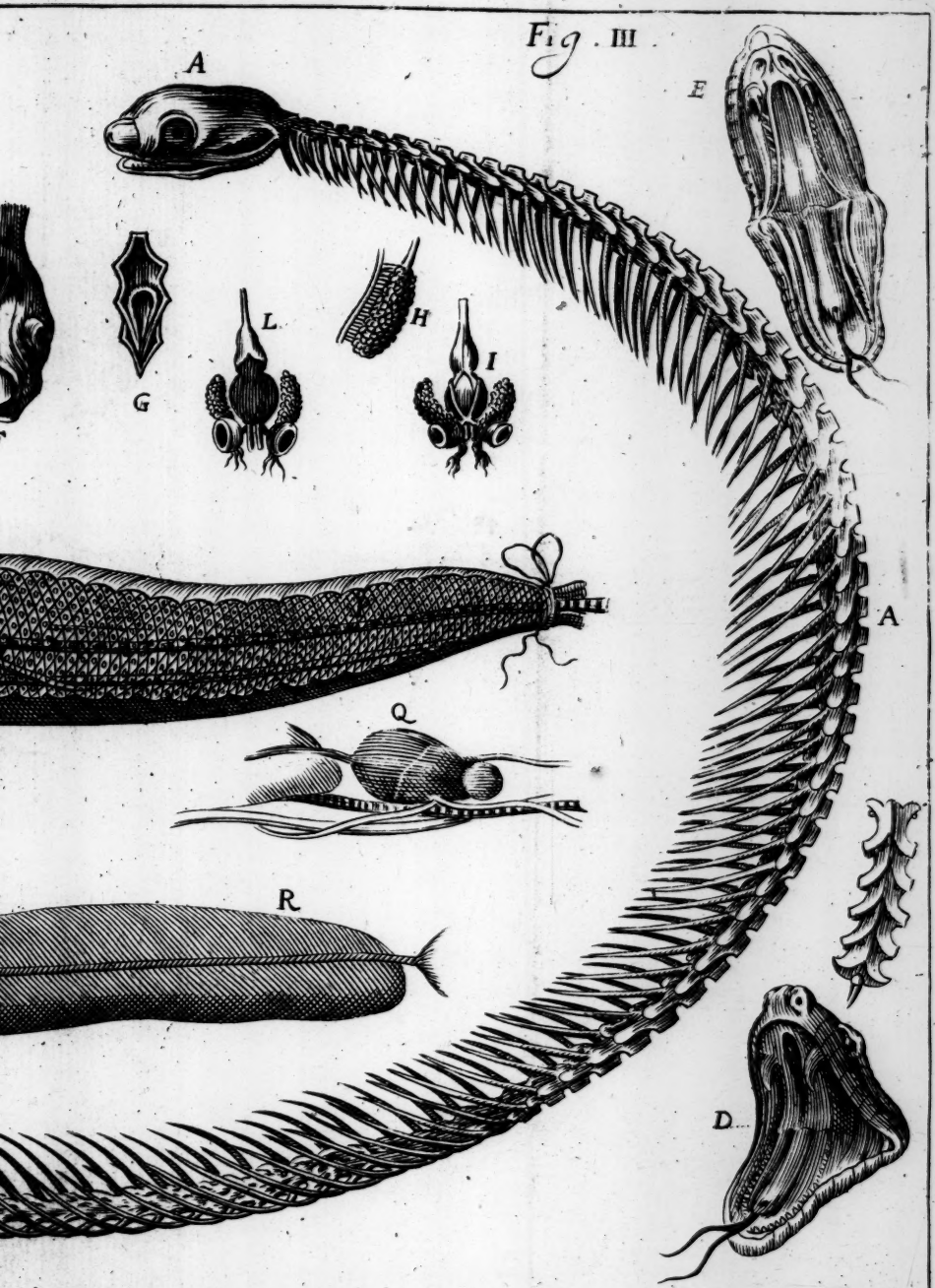

THE ANATOMY OF A VIPER.

General Observations upon this Animal.

CHAPTER I.

I Know not, what ground the Antient Writers upon this Animal had, to say, that in the Copulation, the Male did insert his Head into the throat of the Female, and there emitted his seed, thence falling into her *Matrix*, where she first did form Eggs and then Young Vipers: That the Female, finding a titillation from the emission of the seed, snapp'd off with her teeth the

head of the Male, and ſo kill'd him; and that the Young Vipers, being ready to be brought forth, did pierce the Womb and the ſides of their Damm, to make a paſſage for themſelves; ſo that by killing her, they revenged in ſome manner the death of their Sire.

I confeſs, that this Story, or Tale rather, having neither reaſon nor experience on its ſide, I cannot take the part of thoſe Authors. I eſteem, that a Viper, which is a kind of creeping Serpent, is indeed procreated by the conjunction of Male and Female; but this is done by means of the Organs deſigned for Generation; of which we ſhall make a deſcription in their proper place, and which this Animal hath common with all others, and that more in number, than moſt Animals.

The Viper differs from other Serpents, not only in this, that it creeps more ſlowly, and jumps not; but chiefly herein, that its little ones receive their perfection in the womb, and come forth alive after the uſual manner; whereas the Femals of other Serpents lay Eggs, which they incubate, and hatch, either in the Sun, or in their receſſes.

The Viper is by many taken for an Image of malice and cruelty; but in reality she is guilty of no such thing, if she be not hurt or vex'd; for, if she be, she becoms furious, aud bites very piercingly: but she never assaults Man or beast, except she be angred. And if at times it happen, that she bites some person or other sleeping in the field, certainly that Body must have thrust or otherwise hit her; for else she would never have bit him.

It may very well be said, that by that means the Stratagem of *Annibal* succeeded, when he caused a quantity of earthen Pitchers fill'd with Vipers to be thrown into the Shipps of the King of *Pergamus*, his Enemy; in regard that on the one hand the Pots being broken, did hurt and anger the Vipers, and stirr'd them up to bite whatsoever was within the reach of their teeth; and on the other, the sight of these creeping Creatures, scattered about here and there in the Ships, frighted the Souldiers and disorder'd them, so that they could not fight.

Mean time a Viper attacks and kills those Animals, which she means to devour for her nourishment, as Spanish Flyes, Scorpions, Froggs, Mice, Moles, Lizzards and the

like; which ſhe ſwallows whole, after ſhe hath kill'd them with her bigger Teeth. The ſmaller prey ſhe ſends down whole into her ſtomach; the bigger ſhe partly lodgeth in her ſtomach, partly in her weaſand.

There can hardly be made any perfect digeſtion in the Stomach of Vipers, both becauſe the heat is there not well united, by reaſon of the great aperture, there is at the mouth, where the Oeſophagus or Weaſand ends; and becauſe they have not moiſture enough to help the fermentation and the Concoction of food. But yet this hinders not * the conveyance of the Juyce and of the fineſt part of the ſwallow'd animals into all the parts of their body for nouriſhment: Which is not performed but in the ſpace of many days, during which, the excrements and ſuperfluities of the nutriment are carried into the Gutts, whence the groſſer parts of them are caſt out again by the mouth. This we have lately obſerv'd in a great part of the body of a Lizzard, which a Viper vomited up twelve days after ſhe was taken; where we ſaw, that, of the head and of the fore-leggs, and of that part of the body contiguous to them, and which could

could conveniently be placed in the ſtomach of the Viper, there reſted little more than the Bones; but that a great part of the trunk, together with the hind-leggs, and the whole taile, were in a manner in a condition, as if the Viper had ſwallow'd them that day, as appears in the 2d Figure. But we were ſurpriſed, among other things, to ſee, that the parts, which could not enter into the ſtomach, and had remained in the *Oeſophagus*, had kept ſo long well, I mean, without ſuffring any alteration in the skin; although thoſe underneath had contracted ſome lividneſs, which perhaps was an effect of the venemouſneſs of the biting.

Vipers can live for many months without any food, and after they are once taken, they eat no more, living then only upon the Air, they take in. And although they be greedy enough of Lizzards, when at liberty, yet I have found, that having thrown Lizzards alive into a barrel, wherein I kept a good number of living Vipers, and leaving them there whole days and nights, the Vipers did no hurt at all to the Lizzards.

The Subſtance of Vipers is viſcous and compact, and periſheth not but very ſlow-

ly and difficultly. Their Skin is ſcaly, which defends them from the injuries of the Air, and maketh that the Spirits unite themſelves ſo firmly to the body, that 'tis hard for them to quit it; and we ſee, that they remain yet many hours in the Head and in all the parts of the trunk, after tis ſlead, emptied of all the gutts, and cut in many pieces: And this is the cauſe, that the motions and windings ſo long continue in them; that the Head is able to bite, and its biting as dangerous, as when the Viper was entire; and that the Heart, even after it is pull'd out of the body, and ſever'd from the other inward parts, keeps its beating for many hours. Whence it may be concluded, that the Viper, which is compoſed of parts ſo cloſely united together, and in which are found ſuch perfect Spirits, can impart to Man what it hath moſt accompliſht and in ſo great abundance: So that we need not wonder, if we find the remedies, we draw from its body, are of a not-ordinary vertue.

A Viper voids not much excrement, and what ſhe voyds is not offenſive, whereas that of *Snakes* ſtinks much, and hath the ſmell of ſtale and corrupt Urine. Neither

ther have we ever found any ill ſmell in opening the veſſels, wherein we uſed to keep Vipers alive, unleſs ſome viper or other had been dead and putrifyed. For my part, I have never received any inconvenience from any ill air, which ſome pretend to iſſue forth at the opening of thoſe Veſſels.

Vipers make no holes in the Earth to hide themſelves in, as other Serpents do; but ordinarily they hide themſelves under ſtones or old ruines, where they may be often found heaped up and wound together in cluſters. When 'tis fair weather, they love to lurk under buſhes and tufted plants.

They commonly couple twice a year, the firſt time in the month of *March*; and they goe with their young ones 4. or 5. months; which being perfect, come forth one after another by the common opening of the *Matrix*, and in great number, even to twenty and twenty five. They draw out with them, in coming forth, a ſmall tegument faſtned to their navil, like an after-birth, which the damm by little and little ſeparateth with her tongue, as they are born one after another.

Vipers caſt a skin every Spring, and ſometimes even in Autumne: which hath

occaſioned a belief, that they have a vertue, able to make young again, and to preſerve the ſtrength of thoſe, who uſe them either for a preſervative or a remedy.

THE DESCRIPTION OF A VIPER

CHAP. II.

Of the Parts, which preſent themſelves firſt.

SECT. I.

Of its external Figure.

THe Vipers, Males and Females, that we have in *France*, being of their full growth, are in the middle of their body

dy a good inch thick; but that of Females is bigger, when they are with young, especially when the young ones are ready to come forth. They are commonly two good foot long; and there are some, that are somewhat longer. Their head, which is flat, hath a kind of border round about the edges of its upper part, and in that they differ from *Snakes*, which have all that round bared and taken down, and the Head sharper and narrower, in proportion to their Body.

The Head of a Viper is in all an inch long, and towards the top thereof it is 7 or 8 lines broad; and then lessening by little and little, it is not above 4 or 5 lines broad about the Eyes, and 2 lines onely about the end of the Nose. It is about 2 lines thick.

The Neck, taken where it begins, is about the bigness of a mans little finger. That of Males is ordinarily a little thicker than that of Females: Yet there are some of the Females, which, when full, appear to have a Neck even thicker than that of Males.

The Tail of Males is always longer and thicker than that of Females, because it contains

tains the parts of generation double; and in their Interſtices there are alſo two ſmall bladders ſomewhat long, ſerving for a reſervatory of their ſeed, which make their Tail bigger. This of the Males is about four fingers ſquare long; but that of Females not much longer than three. The upper part of the Taile of Males is, at its beginning, about the bigneſs of their Neck, and ends ſharp, as doth alſo the Tail of Females. Neither of them ſtings, nor have they any venom in them.

SECT. II.

Of the Skin of Vipers.

NO Vipers are ſeen, but they have their skin ſpotted: but the ground of the colour is different enough; for ſometimes 'tis whitiſh, ſometimes reddiſh, in ſome 'tis gray, in others yellow, in others tawny. This ground is always ſpeckled with black ſpots, or at leaſt much darker ones than the reſt; they appear like different cyphers or characters, ranged in ſpaces, even enough, and anſwering one another, eſpecially on the top and the ſides of the Body. Some of them are alſo up-

on

on the Head, and among the reſt, two in the form of Horns, which take their riſe between both Eyes, and open themſelves and reach towards the two ſides of the top of the Head, and are ſometimes 4. or 5. lines long, each of them, and halfe a line broad. Oppoſite to the middle of theſe two horns, there appears a ſpeck of the bigneſs of a ſmall Lentile, being ſhaped like the Iron of a Pike: And this is that, which is, as 'twere, the firſt and principal of all theſe ſpecks, ſeeming to guide them all along the Back-bone.

The Skin is all cover'd with Scales, the greateſt, ſtrongeſt and moſt conſiderable of which, are thoſe under the whole Body, and ſome under part of the Head. Their bigneſs and force is neceſſary for them, to fortify the Viper in the place that is feebleſt and leaſt capable of defence; beſides that they ſupport the Animal, and ſerve it, inſtead of feet, for creeping, and for carrying its Body to and fro. Theſe great Scales are alwayes of the colour of Steel, from one end to the other, and different from thoſe of Snakes, which are commonly mark'd with a yellow colour. They open, and ſtick, according as the

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Viper will recoyle, or ſtop. The extremity of theſe great Scales is, as 'twere, ſow'd beneath the other litle Scales, which cover the whole Body. Thoſe under the Head, reach in their breadth towards the two Jawes; they are leſſer, ſtreighter and ſofter than thoſe under the Belly, and terminate at other ſmaller Scales, which go on to cover the whole undermoſt part of the Head, and, beginning their ranks towards the ends before, continue them at the ſides of thoſe ranks as far as towards the bottom of the Jaws.

From the begining of the Neck unto the beginning of the Tayl, there are as many great Scales, as there are *vertebraes* or Joynts of the Back-bone; and as each *Vertebra* hath on each ſide a Ribb, each Scale meets by its two ends the points of both, and ſerves them for a defence and ſtay: the ſame abuts alſo on each ſide at the end of one rank of litle ſcales, wherewith the reſt of the Body is covered, and it ſeems, that 'tis placed there to receive them. Theſe ſmall ſcales are admirably well ranged, they lying upon one another, and repreſenting each as 'twere halfe a round towards their extremity. Their ranks appear

pear always ſloping, whether you look on them from the right ſide to the left, or from the left to the right; ſome what after the manner of the ranks of ſmall Slate, that are cut in a halfe round, in ſome places ſeen in the tops of houſes. Theſe Scales are more or leſs great, according as the part of the Body, they cover, is greater or leſſer. The Symmetry of them is always very exquiſite and even; and is ſutable to the great Scales, united to their ranks beneath. There are alſo obſerv'd on the top of theſe Scales, and all along the Back, many fine and diſtinct Lines, paſſing ſtreight along from the hind-part of the Head unto the end of the Tayl.

The Scales, that are under the Tayl from the beginning of it to the end, are divided, and yet they appear united and ranged in the middle by a very orderly and pleaſing compartment; and their bigneſs goes diminiſhing in proportion with the Tayl.

The Skin of the Head is alſo covered with ſmall ſcales, and at the end of the Noſe turned up, and ſo on, even round about, as far as towards the Eyes, in the manner of a ſwines-ſnout.

There are obſerved only ſix openings in the

the Skin of a Viper: the biggeſt is that of its Throat; the other four are thoſe of the two Noſtrils, and of the two Eyes; the laſt is that, which is at the lower-moſt end of the Belly, where is the beginning of the Tayl, which incloſeth not only the hole of the Gut for voiding the excrements, but alſo thoſe of the organs of Generation, as well of Males as Females. This laſt opening is ſhut by the laſt of the great ſcales, which is advanc'd in the form of a half round, and opens in falling lower at the time of copulation, as it alſo doth at the time of the young Vipers being caſt, and of the excretion of their dung. The Throat opens and ſhuts at the will of the Animal; the Noſtrils remain alwayes open, and the Eyes have Eye-lids to cover them upon occaſion. There is no aperture in the skin to give any paſſage for Hearing; Nature, it ſeems, ſerving herſelf of the apertures of the Noſtrils for that purpoſe.

Vipers ordinarily caſt their ſcaly Skins twice a year, under which they are furniſht with another, quite formed, which at firſt appears much fairer, and of a more vivid colour, than that which is caſt off. And there is alſo inſenſibly forming an other

ther new one, againſt the time it is to ſerve, when that which now covers it ſhall be ſevered from it: So that a Viper hath at all times a double skin; and all theſe skins, though furniſht with ſcales, are notwithſtanding tranſparent, being held and look't on againſt the day-light.

This *External* deſcription might be ſufficient for thoſe, who ſhall deſire no more but to know how to diſcern Vipers from other Serpents, but the *Anatomical* Deſcription of all the parts under the Skin will be much more ſatisfactory and more neceſſary for thoſe, who ſhall deſire to know exactly all the good and all the ill in a Viper.

CHAP. III.

CHAP. III.

OF the Parts of the Head OF A VIPER

SECT. I.

Of the Noſe and Noſtrils.

BEginning at the extremity of the Head there are the *Noſe* and the *Noſtrils*. The former is made up of a Bone ſome what Griſtly, furniſht with ſome ends of Muſcles, that come farther off, and are accompanied with ſome ſmall veins and arteries. This Bone is alſo cover'd with the ſcaly Skin, turn'd up, as was ſaid above, at its extremities. There are two pipes, in the two ſides, that form the noſtrils, which have each a ſmall and round opening on the right and the left ſide, before, and the proper nerve, which coms down from

from the' fore-part of the Brain unto their Orifice, and communicates to them the objects of ſmelling. The ſame Pipes ſerve alſo to receive two ſmall Nerves, which iſſue each from the lateral part of the Brain, and ſerve for Hearing. This griſtly Bone hath ſeveral Angles round about, and is articulated by two ſtrong Ligaments within and about the hollow and anteriour part of the Skull; which hinders not, but that it is a little flexible in this Articulation,

SECT. 2.

Of the Skull.

THE *Skull* is found hollow in the fore-part of it, and repreſents the ſhape of an Heart in this Cavity, when the Bone of the Noſe is ſeparated from it. There are two points advancing, which in part embrace that Bone; it is in the ſuperior part ſurrounded with a ſmall border, advancing in the faſhion of a Corniſhe; it is notch'd on both ſides, where the Eyes are ſcituate, and there forms their round holes, of which the hind-part reaches out to a point, to which anſwers that before. The whole Skull in

all its parts is of a very compact and hard substance. There are three principal Sutures in the part above; the one, which may be call'd the *Sagittal*, which divides longwayes the part above the two Eyes; the second, which may be term'd *Coronal*, divides the Skull a-cross behind the two Eye-holes; the third, separates it also cross-ways near the beginning of the Back-bone. In the Surface of the upper part of the Skull, may be observ'd the figure of an Heart well represented, seated in the middle thereof, which hath its *basis* near the Suture Coronal, and carries its sharp end towards the hind-part of the Skull, which is sever'd by the third Suture.

There is also another great Suture, round about the nethermost lateral parts of the Skull, by which it may be divided into two bodies, an upper and lower. This latter is made in the form of a turn'd back, going long wayes, hollow in the middle, and representing the shape of a Culter, which hath a kind of little wing on its sides, and whose point advances beneath the middle of the Eyes. Its latter part descends as far as the bottome of the Palate, where it hath in its lower part a point descending

descending in the form of an overturn'd hillock.

All the Sutures of the Skull are so well united in their conjunction, and so strongly connected, that 'tis very hard to distinguish them, and yet more to separate the parts of them without breaking them, unless the Skull be boyled in some liquor.

Sect. 3.

Of the Brain.

The substance of a Vipers *Brain* is divided into five main Bodies, of which the two first are oblong, each of the size and shape of a grain of Succory-seed. They are seated long-wayes between the two Eyes; and 'tis from these Bodies, that the Olfactory Nerves do proceed. The three other are in the middle part of the Skull, and under that figure of the Heart, of which we have been speaking. Each of these Bodies is near as big as a grain of the Seed of *Milium Solis*, and represents almost the shape of a Pear, the point of which is turned towards the fore-part of the Head. Two of these Bodies are seated in the up-

per part long-wayes, and one on the ſide of the other; the third, which is a little leſs, is placed under the middle of the two, and may be call'd the *Cerebellum*, or little Brain.

The *Spinal Marrow* ſeems to be the ſame body with this laſt, although it have a ſeparate place in the hind-part of the Skull. It is of a ſubſtance ſomewhat whiter and ſofter than the Bodies, we have been juſt now ſpeaking of, and of the ſize of a ſmall grain of Wheat. It produces a Body of the ſame ſubſtance, which extends it ſelf long-wayes, and paſſing in a ſtrait line thorough all the *Vertebra*'s or Joints of the Back-bone, terminates at the end of the Tayle.

The Bodies of a Vipers Brain are cover'd with a coat, thick enough, and ſticking faſt enough to them, which may be called the *Dura Mater*: It is black, whence it hath hapned, that ſome Authors, not taking the pains to look under this Tunicle, have affirm'd, that Vipers Brains were black. Under this *Dura Mater*, each Body of the Brain, ſeparately, hath alſo a little membrane involving it, which may be termed the *Pia Mater*. There are obſerved ſome ſmall interſtices betwixt theſe Bodies, and even

even in the Body of the Spinal Marrow, which might pass for *Ventricles*: And I doubt not, but that, if the Subject were a little bigger, we might observe in it most of the considerable parts, that are to be found in bigger Animals.

Sect. 4.

Of the Eyes, and their principal parts; as also of those, that serve for Hearing.

The *Eyes* of Vipers are very quick, and their aspect is exceedingly fixt and bold. They have their Nerves, Muscles, Veins, Arteries, Apple, Chrystallin, Uvea, Cornea, Eye-lids, and the other parts, like enough to those of the Eyes of other Animals.

The most considerable Nerves are the *Optick*, which parting from behind both the Eyes, do meet together and conjoin laterally at the beginning of the Little Brain, and there make as it were the figure of an X, and opening themselves after this conjunction, they encompass that little Body by the sides thereof, and render themselves at

the beginning of the Spinal Marrow, which receives them.

The ſmallneſs of all the other parts being ſuch, as that it maketh their examination difficult, and we having not been able to find any thing particular in them, I eſteem, that as it would be very troubleſome to make Reſearches thereof, ſo it would be to no purpoſe, to make a deſcription of them.

The two upper Bodies of the Brain ſend each from their lateral fore-part a ſmall Nerve, which piercing the Skull, runs along the Temples, where it joins it ſelf to the *Salival Glands* (whereof we ſhall ſpeak hereafter) and following them, it paſſeth under the Eye, where it divideth it ſelf into two branches, of which the chief inſerts it ſelf into the Bone and the Conduit of the Noſtrils, to ſerve for the Senſe of Hearing, and the leſſer deſcending towards the Teeth, called the Dog-teeth, it ends there, after it hath divided it ſelf into ſeveral branches.

SECT.

Sect. 5.

Of the Bones of the Head, that are jointed to the Skull.

ON each upper ſide of the middle of that Heart, which is ſeen above in the Skull, there is a little flat Bone, a matter of a line and an half long, that is firmly articulated to it, which following and adhering to the ſame ſide of the Skull as far as to its hind-part, becomes to be articulated anew to another flat Bone, longer and ſtronger, and forming there as 'twere an Elbow. This latter Bone goeth downwards, and is ſtrongly jointed to the inward end of the lower Jaw; in the middle of which articulation, the upper Jaw terminates, and is there jointed, but not ſo firmly, becauſe it hath other articulations, which the lower hath not. Theſe Bones, which are like *Clavicles*, ſerve both for a ſupport to the Jaws, and to open and ſhut them; and for this purpoſe they are aſſiſted by the Nerves and Muſcles, which Nature hath provided them with.

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There is alſo at each advancing end of the Eye-hole a little flat Bone, being about a line and an half long, which is ſtrongly articulated with the root of the Dog-tooth, and by its other end is alſo firmly jointed to the middle of the upper Jaw, as well to ſupport it, as to make it advance together with the great Tooth, when it is raiſed to bite.

The upper Jaw is divided in two, before, and is ſeparated, by the griſtly Bone, from the Noſe, where its two ends are articulated on each ſide. Theſe two Jaws are much more inward than thoſe below, and the great Teeth are ſeated without their rank, and at their ſide, tending outward, and do ſerve them for a defence. They are made up, each of one only Bone, that is about ſix lines long.

The lower Jaw is alſo divided in two. Theſe Jaws are annexed, before, one to the other, by a Muſcle, which opens or ſhuts them at the pleaſure of the Animal; and they have no other articulation but that, we have ſpoken of about their inward end, *viz.* with the Clavicle coming down from the Skull, and with the inward end of the upper Jaws. Each of theſe

Jaws

Jaws is compoſed of two Bones, articulated together towards the middle of the Jaw; that which is before, embraces above and below that which is behind, and can bend it ſelf outward in this place, when the Viper will bite, and is a little curved inwards toward its extremity; and 'tis upon this Bone alone, that the lower Teeth are faſtned.

SECT. 6.

Of the Teeth.

THe Opinions of the Antients have been very differing about the number of the great Teeth of Vipers, and moſt have held, that in this the Female exceeded the Male, and that the plurality of the great Teeth was the chief mark, whereby to diſtinguiſh her from him. I have been careful to inform my ſelf about it, and have taken pains to grovel with a great deal a patience in the gums of innumerable Vipers; but all being well examined, I have not found, as to this point, any true difference of one Sex from the other, but ſometimes more, ſometimes leſs Teeth in one and the other.

other. I have caſually met on each ſide with two great Teeth fixed, placed very near together, and on the ſide of one another, as well in Males, as Females; but in moſt of both Sexes I have found only one, fixed on each ſide, cover'd, to two thirds of their height, with a Tunicle or Bag ſufficiently thick, fill'd with a yellowiſh juyce, which is tranſparent and pretty fluid; and in this Veſicle, in the midſt of this juyce, and under the great and main Teeth, a differing number of Teeth ill ſet, ſome longer than others, and all hooked, of which I have counted, in ſeveral Vipers, from two to five, ſix and ſeven, on one and the ſame ſide, under the ſelf-ſame Tooth, and in the ſame Bag.

Theſe great Teeth are only in the upper part, ſtanding on the ſide, and without the Jaws of the Animal, where they are like Bulwarks. They are about two lines long, hooked, white, hollow, and diaphanous throughout, as far as to their ſharp point, which is very ſubtle and exceedingly piercing. They have many little Cavities towards their Root, in which the other Teeth are planted. Theſe Teeth commonly remain lying along the Jaw, and their

their point appears not but at the moment the Viper will bite; for then it raiſeth them, and advanceth them jointly with the upper Jaw, drawn by the Bone, which at one end is articulated in the middle of it, and at the other, to the root of the great Tooth.

The yellow liquor, contained in the Veſicle, ſerveth not only to moiſten the ligaments, and to make them fit for the bending of the Teeth, but alſo to nouriſh them, and to make thoſe grow, that are there as 'twere in a Nurſery, and are, if we may ſay ſo, in expectation to ſerve inſtead of the many Teeth, whether theſe come to fail in their force, or fall out of themſelves.

All the Jaws, both upper and lower, are fortify'd with bent Teeth, that are hollow, pellucid and ſharp, as the bigger Teeth, but that they are much ſmaller. Their number is uncertain enough, whether it be, that Nature produces ſometimes more, ſometimes leſs of them, or that that fineneſs maketh them apt to break. There is little difference, as to the number, in thoſe above from thoſe below. Ordinarily there are eight Teeth in each Jaw, but at times I have found nine, ten, eleven in each. Thoſe

that advance moſt, are a little bigger than the deepeſt; and juſt as thoſe below anſwer in ſcituation to the Dog-teeth, that are above them, they have at the end of each ſide one Tooth, that is a little bigger than all thoſe of the other Jaws, and another, leſſer, at the ſide, at the end of the part bent inwards.

There is a great difference in the Teeth and Jaws of Vipers, from thoſe of Snakes: for, *theſe* have no Dog-teeth; and although their Jaws are all divided in their foremoſt part like as in Vipers, yet they exceed them in the number of Jaws, and in the number of Teeth; for, they have four Jaws above, and two below; two of thoſe above are ſituated all along and cloſe to the rim of the Lip, and ſerve for a defence to the two other Jaws, that are ſeated in the ſame place, where thoſe in Vipers are. Beſides, I have counted 13 Teeth in each exterior Jaw above, and as many in each of the Jaws below, and 20 in each ſuperior inward Jaw; ſo that I have counted of them to 92 Teeth in one Snake, and all theſe Teeth are bent, fine, hollow, white and tranſparent, like thoſe in Vipers.

SECT.

SECT. 7.

Of the Nerves, Veins, Arteries and Muſcles of the Head in general.

THE chief Nerves in the Head of a Viper are, firſt, thoſe of which we have ſpoken, namely thoſe of the Smell, the Sight and the Hearing. Beſides, there are *thoſe* of the Taſte, that which may be call'd the ſixth *par vagum*, which is afterwards diſtributed into all the vital and natural parts; and *thoſe*, which iſſuing from the Spinal Marrow are carried through the whole habit of the Body. There are alſo many Nerves, that go from the inferiour part of the Brain, and paſs through the Skull, but by reaſon of their ſubtility and fineneſs, 'tis hard to follow them to their inſertion.

There is yet another Nerve that is conſiderable, which proceeds from the Skull, behind that of Hearing, which leaves, in the ſpace between, a ſmall *Apophyſis*, or Proceſs, or Knot, in the Skull, and which, deſcending along the Clavicle, runs upon the ſuperiour Jaw, and is inſerted in its middle; then

then it goes on in the middle to its extremity, and diſtributeth it ſelf into all the Teeth, fix'd there.

The Head hath alſo its Veins and Arteries, which coming from the Liver and the Heart, diſtribute themſelves there into an infinity of branches, by which all thoſe parts are bedew'd. It is alſo provided of many Muſcles, at the ſides and below the Skull, and about the Clavicles, and ſuperiour and inferiour Jaws, that ſerve not only to fill up the Cavities of the Skull, and to cover the Bones that are articulated there, but to give motion to all the parts that need it: to which alſo the Nerves contribute their ſhare.

Sect. 8.

Of the Salival Glands of a Viper.

THe Opinion of the Antients, That the ſeat of the Vipers poyſon was the *Gall*, and that from thence it aſcended into the Gums, by veſſels odly enough fancied, hath ſeem'd to me too far from all probability to follow it. I therefore thought, that that particular did very well deſerve

deſerve a ſtrict enquiry, and that it was of moment to diſcover the Truth thereof. On the other ſide, the curious Obſervations, made on this Subject by Signor *Redi*, a Florentine Philoſopher, whoſe merit is known and eſteem'd by all the Learn'd, ſeemed to me, as to all thoſe that have ſeen and examin'd them, not only reaſonable and poſſible, but I was altogether perſwaded of the candor and ability of that illuſtrious perſon. Upon his Accompt and Relation, I never ſcrupled to taſte often of the gall of Vipers, as well as of the yellowiſh liquor, contained in the bags of the Gums; and I have found in both the Truth of what he hath obſerved thereof, namely a great bitterneſs, and a great ſharpneſs in the Gall; and the taſte of a *Saliva* or Spittle ſufficiently flat, and approaching enough to the taſte of the Oyle of ſweet Almonds, in the yellow Liquor of the Gums.

Theſe great differences of the qualities in the one from the other, made me believe that there was a great diverſity in the matter of them, as well as in their ſource; and I believed at firſt, following Signor *Redi*, that there might be *Salival* Veſſels in Vipers,

pers, as there have been lately found in Man, and divers other Animals; ſo that after many reſearches, made with attention and patience enough, in many Vipers Heads, I diſcover'd at length ſuch *Glands*, proper to form this juyce, and to convey it to the Gums; and after I was well perſwaded of it my ſelf, I ſhew'd them to divers of thoſe knowing Phyſitians, that had met at my Houſe the laſt Year. Theſe perſons had a mind to ſee with their own Eyes, and after they had well examin'd the parts which I ſhew'd them, they not only found them true, but they there alſo ſaw a greater number of ſmaller veſſels, than had appear'd to me, of which ſome, that are Arteries and Veins, paſs above the *Glands*, and others, that are *Lympheducts*, run below: ſo that they judged, that I could confidently aſſert and deſcribe theſe *Glands*, which I call *Salival*, and which they had acknowledged together with me; though Signor *Redi* durſt not ſpeak *poſitively* of them, becauſe he had not diſcover'd them, neither had they been deſcribed by any Author of their knowledge, nor by any one of mine.

Theſe

Theſe *Glands* are found in all the Heads of Vipers, both Males and Females; they are ſeated on both ſides, and joining to the Skull, in the hind-part of each round of the Eyes, and at the ſame height with them. There are many ſmall ones join'd together, which may be call'd *Conglomerate Glands*, which are eaſily diſtinguiſhable by their form and colour, which is different from the Muſcles, neighbouring to them, and of which there is one, that may be call'd *Temporal*, which in part covers them by its extremity. This heap of *Glands* appears there of the bigneſs of the neighbouring Eye, and extending it ſelf in length, continues its progreſs in the Orbite of the Eye, below, and in part behind the Eye. Each *Gland* hath its little Lymphatique Veſſel, which parts from it as from a little Teat, and goes diſgorging it ſelf into a greater Veſſel, that runs all along and under theſe *Glands*, and paſſeth into the Veſicle of the Gum, and terminates in the midſt of the Articulation, which the root of the great Teeth maketh with the advancing corner of the ſaid Orbite, and with the little Bone, which by its other end is articulated in the middle of the upper Jaw. This

principal veſſel, which, being conſidered alone, is very little in appearance, but is not ſo in effect, ſeing it receives the diſcharge of all the ſmall veſſels, that come from each *Gland*, empties it ſelf into the Bag of the Gums, and carries thither that *Salival* Juyce, which may have qualities approaching to thoſe of the *Saliva* or Spitle of man, or of the foam or drivel of divers other Animals.

The Nerve, which ſerves in the Noſtrils for the faculty of *Hearing*, runs for ſome ſpace along theſe Glands, which are alſo, as I have already ſaid, ſmal Veins and Arteries.

But having well conſidered the ſubſtance, quality, and ſituation of theſe *Glands*, we judged their formation not to be in vain; but that their Uſe, in all likelyhood, was to receive the humidities both of the Brain, the Eyes, and the neighbouring parts; and that their diſcharge was very convenient and even very neceſſary to the parts, which receive that liquor, as well for moiſtening the ligaments of the great Teeth, and to keep them in a condition of bending, at ſuch time when the Viper will bite, and to increaſe the

Teeth,

Teeth, which Nature hath made and ſet in the midſt of this Juyce.

For the reſt, examining and taſting the *Glands* as well as the Juyce, we found a Taſte altogether like that of the Gums, which Signor *Redi* hath deſcribed, namely very near the taſte of the Oyle of Almonds, without any bitterneſs, though it leave, a while after, a little acrimony in the mouth, ſuch as may be diſcerned in all kind of Spitle.

As to the ſmall *Glands*, which Signor *Redi* hath obſerved at the bottom of the Veſicles that contain this Juyce, I can ſay, that I have with great care and diligence ſearched them, and that, 'tis true, I have there found the appearances of Glands, but having opened them, I ſaw nothing in them but ſmall teeth which were faſtned there, and are of the number of thoſe, which I have called *Expectants*, without finding any thing of a Glandular nature there, nor that did, in the leaſt, approach to the ſhape, ſubſtance or qualities of the *Glands*, which I have been deſcribing.

The Viper is not the onely among Serpents, that hath *Salival Glands*; for I have

alſo found of them in the Head of Snakes, which Glands were heaped together longwayes, and ſcituated near each outward upper Jaw, ſerving them for a defence, in a manner, as the Dog-teeth do to Vipers.

Theſe conſiderations, ſupported by many Experiments, made by us, and to be related hereafter, have induced me to call theſe Glands *Salival*, and to aſcribe to them the very ſource of that yellow Liquor, which hath been ſo much decryed, and with-all ſo little known, and is nothing elſe, but a pure and very innocent Spittle. I hope, that thoſe, who ſhall take the pains of carefully examining, after me, theſe *Glands*, and this juyce of the Gums, will not ſtick to give me their ſuffrages.

CHAP.

CHAP. IV.

Of the other Bones of a VIPER, *and the principal Parts, thence depending.*

THe great number of Bones, which reſt in the Body of a Viper after thoſe of the Head, conſiſts only in the *Vertebra*'s or Joints of the Back-bone, and the *Ribs*. Theſe joints begin at the hind-part of the Skull, to which the firſt is articulated; the other are ranged conſecutively, ſtrongly joined to one another, and they continue to the end of the Tayle. Every Viper, both Male and Female, hath an hundred and forty five *Vertebra*'s, from the end of the Head to the beginning of the Tayle, and Two hundred and fourſcore and ten Ribs, which is the double number of the *Vertebra*'s; to each of which there are articulated two Ribs, one to each ſide, which are bent, and do

embrace the vital and natural parts of a Viper, and each point whereof rendevouſes at one of the ends of the great Scale under the belly, which is fit for both; ſo that there are as many great Scales under the belly, from the end of the Head unto the beginning of the Tayle, as there are *Vertebra*'s, conſorted by their two Ribs: Beſides that, there are twenty five *Vertebra*'s from the beginning of the Tayle to the end thereof; and thoſe *Vertebra*'s have not any Ribs, but, inſtead thereof, little *Apophyſes*, or Proceſſes, which leſſen in their magnitude, as the *Vertebra*'s do, tending towards the extremity of the Tayle.

There are four great Muſcles, very firm and very long, which take their origine from the hind-part of the Head, and deſcend, two of them on each ſide of the Spinal Proceſſes, one joining to the Spine, and the other to the ſide and a little below the firſt, which it accompanies all along unto the end of the Tayle. There are alſo two great Muſcles of the like length, which are faſtn'd to the inferiour part of the *Vertebra*'s, and accompany them from one end to the other, as well as the ſuperiour ones. We alſo obſerve, on each ſide, as many intercoſtal

tercoſtal Muſcles, as there any *Vertebra's*, ſerving for the ſame uſe, that thoſe of other Animals do, which ſever the Ribbs from the place of their root unto their point. All theſe Muſcles are alſo accompanied with veins and arteries, as well as the greateſt.

CHAPT.

CHAP. V.
Of the other Internal parts of a Viper.

SECT. I.
Of the Tongue.

THE *Tongue*, which the Viper darts out and draws in often and very quick, preſents her ſelf firſt of all. She is placed between the two Jaws below, and compoſed of two Bodies, fleſhy, long and roundiſh, and terminating in very ſharp and flexible points. Theſe two Bodies are contiguous, and adhere to one another all along, from the place of their root as far as to the two third parts of their length. The inward half of theſe Bodies is of the colour of fleſh, but the other half, I mean that which is often thruſt out, is of colour blackiſh.

The Tongue may be, in all, an inch and an half long. Its root begins half an inch lower

lower than the bottom of the Throat; and 'tis firmly annex'd, below the Neck, to two tendinous bodies, which are two or three lines long.

There are ſome Vipers, whoſe Tongues have three points, and ſome alſo, that have four. Theſe points, though often darted out, prick not, nor hurt any body; though perhaps they may frighten the ignorant. They chiefly ſerve Vipers to catch theſe ſmall creatures, which they have a mind to devour. The Tongue is envelop'd by a kind of ſheath from one end to the other.

SECT. 2.

Of the Wind-pipe and the Lungs.

THE *Wind-pipe* hath its beginning at the entrance of the Throat, where it preſents a hole in an Oval, raiſed on high, and having as 'twere a little beak in its lower part. It is compoſed, at its entrance, of many griſtly rings, joyned to one another; which continue about the length of a good inch, and fall into the right ſide of the Viper, where they meet with the Lungs; and from that place you ſee no more but the half

half rings turn'd upside down, which being joyned on both sides to the membrans, that depend from the Lungs, and which are annexed to it below from one end to the other, being assisted by the said Lungs, serve for Respiration, and continue their rank and their connexion, as far as to the fourth part of the Liver, which lies under it; as well as the Heart. The Winde-pipe is in all eight or nine inches long; and at the place, where its half rings end, it is united with a membrane, which attracts and receives the Air, as far as to the beginning of the intestins, where it forms, as it were, a roundish bottom of a sack.

The *Lungs*, being joyn'd to the Wind-pipe, and making with it one Body, are consequently situate, as it, on the right side. They begin, where the whole rings of the Winde-pipe do end. They are made in the form of a Net; they have no Lobes at all; they are red, very clear and very vivid, of a substance fine enough, sufficiently transparent and a little rough. They are fastned by Membrans to the upper part of the imperfect rings; being seven or eight inches long, and about one inch broad; and all over embroidered with veins and arteries.

SECT.

Sect. 3.

Of the Heart, and the Liver.

THe *Heart* and the *Liver* are alſo ſeated on the right ſide of the Viper; and before the Heart there is, about the third part of an inch, a little fleſhy and flattiſh body, of the bigneſs of a little pea, which is filled with water; this little body is placed under the Lungs as well as the Heart and the Liver, and is ſuſpended by the ſame membrans, which ſupport it: it may be taken for a kind of *Thymus* or kernel, and may ſerve for the ſame uſes.

The *Heart* is ſeated about four or five inches below the beginning of the Lungs; of the bigneſs of a ſmall beane: it is ſomewhat long, fleſhy, and encompaſſed with its *pericardium*, which conſiſts of a ſufficiently thick tunicle. It hath two Ventricles, one on the right, the other on the left ſide: it alſo hath two apertures. The Blood, which comes from the *vena cava*, enters into the right ventricle, and being paſſed into the left, iſſues thence by the *Aorta*, which preſently is divided into two great branches,

branches, one of which aſcends into the upper parts, and the other, paſſing below the *Oeſophagus* or Weſand, and taking its way ſloping, ſubdivideth it ſelf afterwards into many other branches, which ſpread themſelves and are carried to all the parts, to the very end of the Tayle.

The *Liver* is a fleſhy part, of colour red-brown, ſeated half an inch beneath the Heart, and ſupported by the ſame membrans: its length and breadth are unequal enough, but the greateſt Livers, I have ſeen, are five or ſix inches long, and half an inch large. It conſiſts of two great lobes of which the right deſcends a good inch lower then the left. Theſe two lobes are bedew'd by the *vena cava*, which ſeems to ſeparate them all along into two bodies, and which makes even a ſeparation in their lower half, running in their interſtice, and ſerving to joyn them together in one body: The upper half of the Liver is continued, and cannot be divided but by cutting it aſunder.

The Trunk of the *vena cava* is divided into two branches in its upper part, of which the main and biggeſt endeth in the Heart, and the other paſſeth under the Lungs,

Lungs, and from thence into the ſuperiour parts. This Vein in its inferiour part is divided into many branches, which deſcend into all the parts below.

A Viper is deſtitute of a *Diaphragme*, there being no ſolid traverſing tunicle at all, that ſevers the vital parts from the natural: yet it may be ſaid that that fine tunicle, which depends from the Wind-pipe and the Lungs, and goes down towards the Inteſtins, and there forms, as 'twere, the ſhape of a ſack-bottom, may in ſome manner peform the function thereof.

SECT.

Sect. 4.

Of the Gall, and the Pancreas, which the Antients called the Spleen.

THe *Bladder of Gall* is ſituate an inch below the Liver, and on the ſide of the bottom of the Stomack, and it leans to the left ſide. It is almoſt of the ſhape and bigneſs of a ſmall Bean lying flat.

The *Gall* is very green; its taſte very bitter and ſharp; its conſiſtence approaching to that of a Syrup not much boyled.

I have found in the Bladder of Gall but one out-let by a ſmall veſſel, which iſſuing from the inward ſide of its upper part, is bent from its origine, and deſcending, and adhering, even in its beginning, to the internal part of this Bladder, is afterwards divided into two branches, of which the principal and directeſt, paſſing through that Body (which the Antients have taken for the *Spleen*) runs into the Inteſtin, which receives it; and the other leſſer branch, turning about, ſeems to remount to the Liver, but dividing itſelf into many ſmall branches, becomes ſo indiſcernable, that it cannot be followed any longer. It

It is not here, that I will refute the opinion of the Antients concerning the Venomous quality they have aſcribed to the Gall; I leave that for another place, where I ſhall endeavour to maintain the Balſamique quality of this Juyce, and ſhew, that 'tis free from all kind of poyſon.

The *Pancreas* or Sweet-bread, which all Authors have called the *Spleen*, is placed near and a very little below the Gall, and on the right ſide of the Viper. It is of the bigneſs of a good Pea, of a ſeemingly fleſhy ſubſtance, but indeed Glandular. Conſidering its ſituation (which is cloſe to the bottom of the Stomach and towards the entry of the Guts) together with its kernelly ſubſtance, it maketh me believe, that 'tis rather a *Pancreas* than a *Spleen*: but yet I leave the deciſion of it to thoſe, who ſhall take the pains to examine it.

SECT.

Sect. 5.

Of the Oeſophagus or Weaſand, and the Stomach.

The *Oeſophagus* takes its beginning at the bottom of the Throat; its ſituation is on the left ſide, and its paſſage directly on the ſide of the Lungs and the Liver, as far as to its union with the orifice of the Stomach. It is made up of one onely membrane, very ſoft, and eaſy to be extended, and which may be ſwell'd even to the bigneſs of two inches. It is this part, which firſt receives the animals, the Viper hath killed with its great teeth, and ſwallowed whole, it being proper for that purpoſe, both by its large capacity, and by its length, which is of a good foot.

The *Stomack*, which is next, is as 'twere ſowed at its bottom, and ſeems to make but one Body with the *Oeſophagus*; but yet is much thicker, and compoſed of two ſtrong coats, one within the other, and ſticking to one another. The thickneſs of its coats makes, that it cannot be ſwell'd to the ſame bigneſs with the *Oeſophagus*;

for

for it cannot much exceed the bigneſs of an inch. It is between three and four inches long; its orifice is ſufficiently large, as well as its middle, but the bottom of it grows ſtreighter, and is commonly very cloſe and firm, not opening it ſelf, but to eject its excrements into the Gutts. Its internal tunicle is full of rugoſities when 'tis empty, and in it there are very often found little worms of the length and thickneſs of ſmall pins. The Stomach is ſeated on the left ſide, as the *Oeſophagus*; but the bottom of it is turned towards the middle of the Body, to empty itſelf into the firſt Gut.

The length and capacity of the *Oeſophagus*, and the largeneſs of the entry of the Stomach, are very well accommodated to the nature of the Viper, which ſends nothing chew'd to the Stomach, but ſwallows Animals whole for its food; and when ſome of them happen to be longer than the depth of the Stomach, part of them ſtayes in the *Oeſophagus*, untill the Stomach have extracted and ſent away the juyce of the parts devoured, which it could hold; after which it receives thoſe that ſtay'd in the *Oeſophagus*. But this requires a good ſpace

of time, in regard that the Stomach is not closed, and cannot gather any considerable heat to make a speedy digestion.

Sect. 6.

Of the Intestins, kidneys, Fat, and a Tunique wrapping them up below.

THE *Intestins* of Vipers are situate in the midst of the Body, under the Back-bone, and immediately after the bottom of the Stomach. I have onely observed three of them, of which the first and narrowest may be called the *Duodenum*; the second, which is larger, and full of many windings, may be called the *Colon*; and the third and last, the *Rectum*, which also is very large and very streight; and hath its aperture below and near the beginning of the tayle, at which the Excrements pass away.

These Intestins have, at their sides, *Testicles*, together with their vessels, both of the

the Males and Females, and the two bodies of the *Matrix* of the latter, which we ſhall ſpeak of hereafter. They contain alſo the *kidnys* with their veſſels, which part from thence, and are accompanied of their veins and arteries, as alſo all veſſels ſerving for generation; and the Inteſtins themſelves are not deſtitute of them.

The *kidneys* are placed below the Teſticles; they are made up of many glandulous bodies, contiguous, and ranged longwayes, one after another. They are commonly two inches and an half long, and two lines and an half large upon the round, which is a little flat. They are of a pale-red colour. The right kidney is alwayes ſeated higher than the lower in both ſexes. They have alſo their *Ureters*, at which they diſcharge the ſeroſities near the extremity of the Inteſtin.

All the Inteſtins, the Teſticles, and the kidneys are covered with a very white and very ſoft *Fat*, which being melted hath the form of Oyle. At times alſo there is ſeen in ſome Vipers a little Fat about the Heart, the Lungs, the Liver, but eſpecially cloſe to the Gall, and near that part, which ſome take for the *Spleen*, and others

for the *Pancreas*. All these parts are wrapped about with a strong Coat, that is firmly fastned to the extremities of the Ribbs, which might pass for the *Epiploon*, if the Fat were joyned to it: but as the Viper, which is a kind of Serpent, passeth not but among the imperfect animals, I shall not determine the name of this Tunique, to which the more Intelligent may give what name they shall think most proper.

CHAP.

CHAPT. VI.

Of the parts of Vipers, that ſerve for Generation.

SECT. I.

Of the Parts of the Male.

THE Male hath two Teſticles, which are ſomewhat long and roundiſh, and ſharpen a little toward both ends. Their colour is white, and their ſubſtance glandular. Their length is unequal, the right being longer by an inch, than the left, and this alſo ſomewhat leſs in thickneſs. They are not thicker than the quill of the wing of a great Capon. Their ſituation is different; for, the right begins near and beneath the Gall, whereas the left begins about eight lines lower than the right. They are both ſuſpended in their upper part by two ſtrong membrans, coming from below the

Gall, and are ordinarily covered with fat, which maketh them hardly discernable, by reason of the likeness of colour they have with this fat.

From the midst of each of these Testicles, from the inward part, one may see issue forth a little Body, long and slender, solid enough, and even somewhat whiter than the substance of the Testicles, which descends, and is fastned to them all along as far as to their lower end. It may be called the *Epididymis*. There appears at the end of each, the beginning of a small straddling vessel, that may be called *Spermatique* because of its office; which is a little flat, very white, and shining enough, and commonly filled with seed, having the form of a milky juyce. This vessel is sufficiently delicate, and winds in its passage, after the shape of many Ss joyned together, very pleasant to behold. From thence it descends between the Intestin and the kidney, whose *Ureter* it follows unto the hole of the last Gut, at which the Excrements pass away. It is also accompanied of veins and arteries from one end to the other, as well as the Testicles, and it ceaseth to be winding a little before it comes to the aperture

ture of the Gut. Each of these two ſpermatique veſſels comes to rendevouſe at its proper receptacle of ſeed; of which there are two, that may be called *Paraſtates*, which are like white kernels, each of the length, bigneſs and ſhape of a grain of *Carduus benedictus* ſeed. Theſe kernels are ſeated longways below and between the two natural parts: they are always full of a milky juyce, and altogether like that of the ſpermatique veſſels, juſt now deſcribed: and to furniſh for ejaculation at the time of the *Coitus*, they tranſmit the ſeed, which they contain, into the ejaculatory pipes of the two natural parts, neighboring to them.

I may ſay on this occaſion, that thoſe who have taken theſe two Conſervatories of ſeed for other Teſticles, have much deceived themſelves in the opinion, they have entertained, that, there being two natural parts, there muſt alſo be for each of them two teſticles: But their ſubſtance being quite different from the true teſticles, by us deſcribed, and their office being to receive, and not to form, we do not acknowledge them but for *Paraſtates*, which by little and little receive the Seed, ſent thither by the Teſticles, and reſerve

ſerve it, and keep it ready for the time of copulation, and to perform that in a moment, and ſeaſonably, what the ſpermatiqne Veſſels would not be able to execute ſo ſoon, nor ſo well, becauſe of their length and windings.

The Male hath two *Penes's* altogether alike, which being pulled out are each as long as the Tayl of the animal. Their origine cometh from the extremity of the Tayle, under which they are ſeated all along, the one by the other. They go increaſing in bigneſs, as the Tayle does; at the beginning of which they end, and they have their iſſue near and at the ſide of one another, and cloſe to the opening of the Inteſtin, which maketh in a manner their ſeparation.

Each of theſe is compoſed of two long and fiſtulous bodies, ſeated together one by the other, and which joyn towards their top in one body, which is environed with its prepuce, and hath its Muſcles *Erectors*, as many other Animals have. Theſe parts are within full of many ſtings or pricks, very white and hard, and very ſharp, ſo ſet, as that they have their ſharp end variouſly turned; of which the bigneſs and thick-

neſs

neſs anſwers to the place of the natural part, where they are ſet, ſo that as the top is bigger and thicker, the ſaid ſtings are ſo too; and they advance and appear not but when the prepuce, which covers them, ſhrinks down at the time of the animals diſpoſition to the coit.

Theſe natural parts are ordinarily hidden, and they ſwell not, nor come forth, but for the coit; unleſs it be, that, the animal being taken, they be forced out by preſſing them; for in that caſe one may ſee them both come forth equally, each about the thickneſs of a *date*, and of the length of two thirds thereof, and their top is altogether covered and quite beſet with theſe pricks, like the skin of a Porcupin; and theſe ſtings retire and hide themſelves under the prepuce, when one ceaſeth to preſs them.

The iſſue of theſe two parts is environ'd with a very ſtrong and thick Muſcle, to which the skin is firmly faſtned, and in ſuch a manner that it is very difficult to ſeparate it therefrom: which ſame Muſcle ſerveth alſo to open and ſhut the Inteſtin.

SECT.

Sect. 2.

Of the parts of the Female Viper, that ſerve for Generation.

THe Femal Viper hath two Teſticles, as the Male; but they are longer and bigger. They are ſeated on the ſides and near the bottom of the two Bodies of the *Matrix*, and the right is higher than the left, as 'tis in Males. Their Subſtance and colour alſo are very like them. The right is about one inch and an half long, and two lines and an half large; the left is ſomething leſs. They have their *Epididymis*, and their Spermatique veſſels, that convey the ſeed into the two Bodies of the *Matrix*, and which are much ſhorter than thoſe of the Males. Yet I obſerve, that theſe Teſticles appear not always ſuch in all Females, eſpecially in thoſe that are emaciated, either by ſickneſs, or by long keeping; for, their Teſticles ſhorten, ſtreighten, and dry, like as in thoſe, whoſe Eggs are already great; having obſerv'd, that in theſe the Teſticles are much ſhortned and dryed up, as alſo that they are deſcended lower, al-

although the right be alwayes found higher than the left.

The *Matrix* begins in a body pretty thick, which is compos'd of two ſtrong tunicles, and which being ſeated above the inteſtin, hath in the ſame place its orifice, which is large, and doth eaſily dilate, to receive at one and the ſame time, by the ſame aperture, the two *Penes*'s of the Male, in the Copulation. This Body is about the bigneſs of a nail of a middle-ſized finger, and is divided very near its beginning into two ſmall baggs open at the bottom, and fram'd by Nature to receive and embrace the two members of the Male in the coit. Their interiour coat is full of rugoſities, and very hard, as is that of the whole body, which we have ſpoken of; ſo that ſhe ſuffers, and alſo feels pleaſure from, the pricking of the little ſtings of the Male's members, without being hurt thereby, although their points be very ſharp.

The *Matrix* begins by theſe two little ſacks or baggs to be divided into two bodies, which aſcend each on its ſide along the kidney's, and betwixt them and the inteſtins, as farr as to the bottom of the Sto-

Stomach, where they are ſuſpended by ligaments, which come from about the Liver, being alſo ſuſtained, from ſpace to ſpace, by divers ſmall ligaments, that come from the Back-bone. Theſe two bodies are compoſed of two tunicles, that are ſoft, thin, and tranſparent, being one within th' other. Their beginning is at the bottom of thoſe two ſmall bags, which embrace the two members of the male, from whence they receive the ſeed each from its ſide, to breed Eggs of it, and ſo young Vipers, by the conjunction of their own ſeed, which the teſticles ſend thither.

Theſe two Bodies of the *Matrix* do very eaſily dilate themſelves, that they may contain many young Vipers, unto the time of their perfection: notwithſtanding the opinion of ſome, who have affirm'd, that the *Matrix* of a Viper had but one onely body; that it was ſeated in the midle, and all along the Back-bone, and that there were in it diſtinct Bodies to hold the Eggs, and the young Vipers, which bodies were dependants of this *Matrix*. But, I believe, that the ground of their miſtake hath been, in that thoſe true bodies of the *matrix* being very delicat and very tranſparent, eſpecially

cially when they are ſwell'd and diſtended by the Eggs, or the Vipers, by them contained, have not paſſed in their opinion for true bodies of the *Matrix*, and that they have taken for it the inteſtins, which are ſeated in the middle, and appear pretty bigg and thick, and ſeem to make but one and the ſame body with the firſt thick body of the *matrix*, under which the beginning of the firſt inteſtin is faſtned and ſeated.

The Viper is not the onely animal, that hath her *matrix* divided into two like Bodies, equally placed each on its ſide, and along the Guts, which ſeparate them; for I have obſerv'd the ſame thing in many *Snakes*, which I have open'd purpoſely to know the truth hereof.

SECT.

Sect. 3.

Of the Generation and Production of young Vipers.

BY the particular deſcription, we have made of the parts ſerving the Viper for generation, is is eaſy to renounce all the Fables we finde in Books, concerning the copulation of Vipers, and the production of the young Vipers: ſo that I ſhall not trouble the Reader any further with them, but onely intimate, That by the means of the inſertion of both members of the Male into the two baggs of the *Matrix*; by the ejaculation of the Seed, made of them both together, into the two bodies of the ſaid *Matrix*, which are united at the bottom of the baggs; and by the concurrence of the Femals own ſeed which her teſticles emit at the time of the coit; the Eggs are firſt formed in both the bodies of the *Matrix*: that each is covered by its little tunicle; that the Eggs of each body of the *Matrix* are altogether wrapped up in one common membrane, commonly

monly called the *Ovarium*; that all is inclosed in its proper body, the *Matrix*; that the Eggs there take their increase; that the young Vipers are there formed and perfected; that thence they come forth one after another by the same passage, where the seed of the Male went in; and that they are produc'd alive, as many other animals, without any need of the intervention of the dam's death.

We can assure the truth of all these particulars, having verified them by an accurate examination of all the parts, at several times, and upon a great number of subjects; and having seen the extension and swelling of those two bodies of the *Matrix*, even at the time when the young Vipers were perfected and ready to come forth; and lastly having seen the passage free, by which they were to come abroad, and the young ones actually produced without any danger to the Dam.

We have noted, that the right body of the *Matrix* of the Viper is ordinarily fuller of Eggs and young brood, than the left; that the number of Eggs is pretty unequal; that at times there are twenty or twenty five, sometimes but half so many; that the young

young Vipers take their form and perfection in the Egg; that there they are seated and entangled divers wayes, and after a very pleasant manner; that they have each within their Egg a kind of after-birth depending from their Navil, by which they draw their food, that in coming abroad they train it after them, and in part are encompassed with it; and that their Dam frees them thereof, and cleanseth them by licking them when they are born.

But although we have, as exactly as we could, described all the inward and outward parts of a Viper, both of a Male and Female; yet to the end that all may be the better understood, we shall address the Reader to the following Schemes, wherin he may see the same parts, we have just now described, represented and drawn to the life, together with their explication in the *Tables* accompanying them; hoping, that he will there find satisfaction.

The

The Reader is desired to take notice, that, having on the Frontispice of this Book represented two Vipers, *a Male and a Female, conjoyned* tempore coitûs, *and there being in the exteriour part of their Body no considerable difference in the one from the other, but in their Tayle, of which the representation may be seen separately in the* second *Figure; I thought it needless, to exhibit the whole Figure of a* Male *by it self; and have contented my self to have engraven the* Female *in the state she is at the time when she produceth her young ones, which is that, which seem'd to me the most considerable for her exteriour Figure.*

He will also find no fault with the Situation, *in which the* Viper *is represented in the Cutt, at the time when her young ones come forth, since that besides the Symmetry, which hath been there industriously observ'd, it was also intended to shew therein the parts, that seem'd very necessary to me, and that could not be represented elsewhere.*

The EXPLICATION *of what is represented in the first Scheme.*

A A A. The Female Viper, bringing forth her young Vipers, exhibiting the lowermost part of her Body; where you may see the great Scales, on which she creepeth.

B B B B. Four young Vipers, each in one of the corners of the Cut, appearing wreathed, and in the same posture and situation, wherein we have seen them alive and ready to come forth; two of which appear without cover, one cover'd with its Coat, and the other having a piece of its After-birth depending from its Navel.

C C C C. Four other young Vipers, within the round, which the Viper formeth; one of which appears creeping, and clear of its Secundine; the other having it yet depending from its Navel; the third coming forth, and training along with it the Secundine; and the last wrap'd about by it, and in the state, wherein it was, when ready to be born.

D D. A part of a Female Viper, repreſented open under the belly long-wayes, and turned upſide down, from the place of the Gall, unto the Orifice of the *Matrix.*

E. The Gall.

F. The Pancreas or Sweet-bread, which many have taken for the Spleen.

G. The bottom of the Stomach.

H. The beginning of the Inteſtins.

I. I. I. The Eggs contain'd in the two bodies of the Matrix, but being found in a far greater plenty in the right, than the left body.

K. A part of the laſt Gut.

L. The Orifice of the Matrix, and of the Gut.

M M. The two little Baggs, which join to the beginning of the two bodies of the *Matrix.*

N N. A part of each of the Kidneys.

The EXPLICATION *of what is repreſented in the ſecond Scheme.*

A A. The firſt half of the body of a Male Viper, flead, turn'd upſide down, and open under the belly from one end to the other, containing

B B. The Wind-pipe.

C C. The Lungs.

D. The Thymus or Kernel.

E. The Heart.

F. The Liver.

G. The great Vein, call'd *Vena cava.*

H H. The *Oeſophagus* or Weaſand.

I. The aſcending branch of the *Aorta.*

L. The deſcending branch of the ſame Artery.

M. The Stomach.

N N. The other half of the Body, in the ſame condition with the firſt, containing

O. The bottom of the Stomach.

P. The bladder of Gall.

Q. The Pancreas, or, according to ſome, the Spleen.

R R R. The Inteſtins.

S S. The Teſticles, together with their *Epididymis.*

T T. The Spermatick Veſſels.

V V. The Kidneys.

a a. The Tayle of a Male, to which are annext the parts that follow.

b b. The two members of Generation, as they come forth at the time of the Coit.

c c. The two *Paraſtates*, or Conſervatories of the Seed.

d d. The two Spermatique Veſſels.

e e. The two Teſticles.

f f. The two Epididymes.

g g g. The Guts.

h h. The two Kidneys.

i i. The Tayle of a Female, to which are join'd the parts following.

l l. The Orifice of the *Matrix.*

m m. The two ſmall Baggs.

n n n n. The two bodies of the *Matrix.*

o o. The two Teſticles with their Epididymes, and Spermatique Veſſels.

p p. The Inteſtins.

q q. The two Kidneys.

r r. A great part of the body of a Lizard, of the ſame length and bigneſs, it

was vomited up by a Viper, many dayes after this had been taken.

s s. The rest of the Head, and the rest of the Fore-legs of the same Lizard, cast up at the same time.

t t. The *Oesophagus*, that had contained the said great part of the Lizard.

u u. The Stomach, that had contain'd, and by little and little extracted the juycie substance of the rest of this Animal's body.

The EXPLICATION *of what is exhibited in the third Scheme.*

A. A whole Sceleton of a Viper.

B. The Head having its Throat closed, represented with a part of its Neck.

C. The Head having its Throat in part open, stead on its side, and there presenting the *Salival Glands*, together with their *Lymphatick* vessels, above the great Teeth.

D. The Head without Neck, represented with the Throat open.

E. Another Head without Neck, more open, and distinctly shewing all its internal parts that can be there represented, and which

which may be easily understood in reading the places, where I speak of them.

F. The whole Skull of a Viper.

G. The inferiour part of this separated Skull.

H. The conglomerate *Salival Glands*, represented with their *Lymphatick* vessels, a little bigger than the natural, to make them the better to be understood, and as well as their smallness permits.

I. The same *Salival Glands*; the two Eyes with their Optick Nerves; the five bodies of the Brain, and that of the Spinal Marrow, adhering together, sever'd from the Crane, and represented by the face above.

L. The same bodies joined together, represented by the face below.

M. Divers great Teeth, some by themselves, some in their bag, others accompanied by the Teeth *Expectants*, which are set beneath them in the same bag.

N. The upper Jaw articulated to a small bone, which by its other end is articulated to the root of the great Tooth.

O. The lower Jaw, consisting of two bones, and articulated to the lower bone of the Clavicle bent like an Elbow, which de-

pends from the posteriour lateral part of the Skull.

P. The Lungs with the Wind-pipe without the body.

Q. The Heart in its *Pericardium* or inclosing Membrane.

R. The Liver separated in two Lobes by the *Vena Cava.*

S. The bladder of Gall, with the vessel that carrieth its juyce into the Intestins.

T. The *Pancreas* or Sweet-bread, which some take for the Spleen.

V. The Intestins.

EXPERIMENTS

EXPERIMENTS ABOUT VIPERS.

CHAPT. I.

The Biting of a Viper, hapned to a Man.

IN the Month of *June* of the year 1668, I procured a great number of live Vipers, Males and Females, to put the design in execution, I had purposed to my self; Which was, to know in truth all the good and all the evil, a Viper was capable of. I was happy enough in exciting the Curiosity of many intelligent Persons, and amongst others, of some Phy-

Phyſitians of my acquaintance, very knowing and ſagacious, who were pleaſed to take the pains of coming to my houſe every day, to aſſiſt in theſe experiments, and to impart to me their directions.

The firſt Meeting of all proved a ſad one by a ſurpriſing mis-fortune. A certain Forrainer, drawn to ſee our Experiments by his own curioſity, felt in his own perſon, contrary to his expectation, a great part of the grievous accidents, which may be cauſed by Vipers, and furniſht us, ſore againſt our wills, with an Experiment, which was followed with circumſtances too conſiderable to be ſuppreſſed; and I thought my ſelf obliged to recite them firſt of all, becauſe it was not onely the firſt, but the onely, that hath furniſht us with more remarkable things, than all the reſt.

This Gentleman, of 25 years of age, had been by chance the day before at my houſe, when five or ſix douzen of Vipers were brought thither. He would needs ſee them immediately, and I, being deſirous to ſatisfie his Curioſity, drew out of the Veſſel one of the Vipers. He was not contented to ſee her, but took her in his hand,

hand, and kept her there for about a great quarter of an hour, ſuffering her to turn and winde herſelf about his hand and arm, the Viper not ſo much as offering to bite him: Then he tyed her about her neck, and ſo having hanged her, pulled off her skin, and emptied her of her Guts to examine them. I am aſſured, that he would have been ſoundly bitten at that time, if the Viper had been vexed; but not having been ſo, and being pleaſed to breath another air than that of the Veſſel, where ſhe had been long ſhut in, ſhe let herſelf be tyed, after which ſhe could not do that miſchief, which certainly ſhe would have done, if ſhe had not been tyed.

But this proved quite otherwiſe the next day; for this ſtranger being come again to my houſe at the hour of the Aſſembly, he ſaw one of the Vipers upon the Table, which had been held a long while between Pincers, and was much angred. He would take her with his naked hand, though he was earneſtly warn'd to forbear, it being repreſented to him, that he had been too bold already the day before. He had no ſooner taken her in his hand, but ſhe turn'd her head to bite him, and with one of her

great

great bent teeth, ſhe laid hold on the lateral inward part of his right thumbe, a little above the ſituation of the nail. The pricking appear'd no more than that of a pin; and it ſeem'd to us not deep, and on the ſurface we only ſaw a very ſmall hole with a very little redneſs; ſo that it was not diſcernable but by its colour. There was not *upon*, nor *about* this litle hole, any ſign of that yellow liquor contain'd in the baggs about the great teeth, and which is wont to be ſhed upon the wound, when a Viper biteth deep; yet the pricking cauſed ſome pain to him at the very firſt, but the finger ſwell'd not of it, no intumeſcence appearing but ſome hours after, as we ſhall relate more amply in the ſequel.

It was found proper to ſcarify the part wounded, and to make ſtrong ligatures above the place bitten, both to ſtop the effects of the Venom, and to diſcharge the wounded part of the ſame; but the Patient oppoſed theſe means, not believing them neceſſary; and he could very hardly be perſwaded to endure any ſcarification; after which, he endured alſo an iron ſpatule very hot and heated over and over again, held very near to the prick't

place;

place; which was done, to keep the pores open, and to fetch back and draw out some part of the poyson: Mean while, we made the Patient take two drachms of Theriaque in half a glass of Wine.

In less then half a quarter of an hour after the pricking, the patient felt some debility, and call'd for a chair; he wax'd at the same time very pale, and his pulse was found very low, very quick, and even interrupted. These accidents were followed by convulsive motions, and by a stiffness of his whole body, and chiefly of his neck, and the muscles of his head: he then also complain'd of a very great pain towards his Navil; and there appear'd a coldness in his extreme parts, and in the whole face, which was covered with little drops of cold sweat: his lips also were swell'd, especially the lower. And finding himself urged by the pains about his Navil, and a disposition to go to stool, he rose, and having voided some excrements, he vanish't away, and at the same time vomited not only all the Theriaque he had taken, but all he had eaten at dinner, which was yet un-digested. We made haste to succour him, and found him so fee-

ble,

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In leſs then half a quarter of an hour after the pricking, the patient felt ſome debility, and call'd for a chair; he wax'd at the ſame time very pale, and his pulſe was found very low, very quick, and even interrupted. Theſe accidents were followed by convulſive motions, and by a ſtifneſs of his whole body, and chiefly of his neck, and the muſcles of his head: he then alſo complain'd of a very great pain towards his Navil; and there appear'd a coldneſs in his extreme parts, and in the whole face, which was covered with little drops of cold ſweat: his lips alſo were ſwell'd, eſpecially the lower. And finding himſelf urged by the pains about his Navil, and a diſpoſition to go to ſtool, he roſe, and having voided ſome excrements, he vaniſh't away, and at the ſame time vomited not only all the Theriaque he had taken, but all he had eaten at dinner, which was yet un-digeſted. We made haſte to ſuccour him, and found him ſo feeble,

ble, that he was not able to goe up again to the chamber, whence he was come down. And in regard his pulſe continued weak, low, quick, and unequal, and his ſwoundings frequent, as well as his cold ſweats, it was thought ſeaſonable to give him a drachm of Viper-powder in *Theriacal* and *Carduus Benedictus* water, and to apply to him a great Plaiſter of Theriaque upon the Heart and Stomach, but he ſoon rejected what he had taken. One alſo came to give him ſome of the *Orvietan*, mixt with new powder of Vipers, but he vomited up that alſo, and deſired to be put upon a bed, and to have other help adminiſtred to him. During all which time, he neither wanted his ſenſes, nor the uſe of reaſon, notwithſtanding all the feebleneſs of his Body; and he had had great averſion to the *Orvietan*, having no faith at all in it, and not conſenting to take it, but out of reſpect to ſome of thoſe that were preſent, who had preſſed it upon him.

This vomiting not giving time to the remedies to convey and communicate their vertue to the noble parts, it was judged very proper to have recourſe to the Volatile-

tile Salt of Vipers, becauſe that being very volatile and exceeding fit to be quickly conveyed to all the parts, even the moſt remote, the Patient might thence feel the effects with more ſpeed and efficacy, than from all the other groſſer remedies, which having been rejected as ſoon as they were taken, had not had time to be made effectual by the ſtomach, nor to impart their vertue where need required.

We therefore cauſed to be diſſolv'd a drachm of this volatile Salt of Vipers in Theriacal and *Carduus* water, and gave him about a quart of this mixture; he kept it a little while, and then caſt up a part of it, mingled with ſtore of phlegme very viſcous. We made him take another like quantity of the ſame mixture, which he alſo kept for ſome time, and then vomited up, what might have remain'd of it in his Stomach, and amongſt it much phlegm. We continued to give him ſtill more of the ſame compoſition as faſt as he vomited it up; and there were alſo given him ſeveral Clyſters, to appeaſe the violent and ſtubborn pains, which he felt about his Navil.

His lips remained ſtill ſwolne, his pulſe naught,

naught, and his ſweat cold, as well as his faintings continued very long; but having perſiſted in the uſe of the Volatil Salt of Vipers, his vomiting ceaſed, and he kept the eighth *doſe* in his belly, which was given him about four hours after he received the miſchief: the ſymptoms leſſen'd from that time, the cold began little by little to retire, and gave place to the natural heat, which appeared ſufficiently about five hours after the pricking; his pulſe returned, and was even and ſtrong, but ſomewhat high.

It was about ten of the clock at night, that the moſt troubleſome accidents diſappear'd, the Patient was happy in his unhappineſs, in being ſpeedily and rationally ſuccour'd. I left him not, before his mortal accidents had ceaſed; and then he was carried to his lodgings, whether I accompanied him, and he was put to bed; and by the advice of thoſe perſons, that frequently viſited him during his diſtemper, I made a mixture of one drachm of Confection of *Hyacinthe*, and of as much of the Confection of *Alkermes*, and of one ounce of Syrup of Limons, and of four ounces of *Carduus*-water, which was giv'n him

him at three times, from three hours to three hours. There were given him Citrons to ſmell to, and from time to time ſome ſlices of them ſugred. He took good broths, and drank ptiſan made with *Scorzonera*-roots, and the ſhavings of Harts-horn, mingled with Syrup of Limons, he alſo drank ſometimes a little wine, and there was diſſolved of the Confection of *Alkermes*, ſometimes in his broth, ſometimes in his ptiſane.

This is a thing remarkable enough, that during all the great accidents, his finger was not changed, and there appeared not any ſwelling upon it, but that began, when thoſe accidents ceaſed. In the mean time, the pains about the navil continued, though they were in ſome little degree abated; which obliged the Phyſitians often to preſcribe him Clyſters. His belly was a little ſtiff, but not ſwelled; his tongue was whitiſh, but not dry; his eyes faint and wan; his countenance pale, and his lips ſtill ſwelled.

The ſwelling of the finger extended it ſelf that night over the whole hand; which was often anointed with the Oyl of Scorpions, compoſed by *Matthiolus*, and mixt

with the *Queen* of *Hungarie's* water, but, notwithſtanding this anointing, the tumor paſſ'd onto the arm the next day, with pain and redneſs, and advanced to the Eye. It was thought fit to apply fomentations made with the roots of *Angelica, Imperatoria, Carlina,* and *Ariſtolochia,* and with the tops of *Scordium, Centaurium, Wormwood, St. Johns wort, Calamint,* boyled in White wine, and withal to continue the anointing with the ſaid Oyle of Scorpions among theſe fomentations. Although this was done with great care, yet there appeared no great effect upon it; the Patient was ſqueamiſh, and once vomited up even his broth; but this vomiting continued not. He alwayes uſed the ſame internal and external remedies, and the ſame food; but although he found his other limbs in a good condition, and his pulſe very equal and moderate, nor had any drought, heat, or pain in the reſt of his body, yet was that of the Navil obſtinate; and the ſwelling and the redneſs of the hand and arm ſtill increaſed; and from the beginning of the third day, it had ſeiſed on the ſhoulder of the ſame ſide, and deſcended to the armpit, upon the whole breaſt, and all the neighbouring

bouring parts, and even the whole region of the Liver, notwithſtanding the continual uſe of the fomentations, and the Oyle of Scorpions.

All theſe conſiderations, joyned to the hot ſeaſon, wherein we were, made us apprehend, leſt the gangrene ſhould ſtrike to thoſe parts. It was believed, that, ſince the outward remedies which had been judged moſt expedient, had proved ſucceſsleſs, recourſe muſt be had to internal ones; which induced the Phyſitians to give him, in the evening of the third day, a drachm of the root of *Contra-yerva* in powder, diſſolv'd in cordial waters, with as much confection of *Alkermes*: but we ſaw no abatement of the redneſs, ſwelling, or pain; on the contrary, we obſerv'd, that the ſwelling ſeem'd to ſeize on the left ſide.

After we had well examin'd all things, we found it very neceſſary to return to the uſe of our firſt inward remedy, which had ſtruck the great ſtroke, and had had a manifeſt good operation; I mean, the *Volatil Salt of Vipers*. This was in the morning of the fourth day after the biting. So we gave him half a drachm of that Salt, diſſolved in four ounces of *Carduus* water, and

we order'd that he ſhould be well covered, to make him ſweat. This medicine did work according to our expectation and deſire; for the Patient not onely did ſweat abundantly, but found a very conſiderable amendment in all the ill Symptoms that had remain'd. His pain about the navil was almoſt not ſenſible; the tumor of his Lips, and that, which was in the region of the Liver, Breaſt, and under the Armpits, vaniſh't; and that of the ſhoulder, Arm and Hand was much abated, as well as the redneſs and pain.

We thence judg'd, that we ſhould certainly cure the reſt; and to compaſs it, we gave the next morning to our Patient a like doſe of that Volatil Salt of Vipers, which made him ſweat again very largely; the pain of the Navil ceaſed altogether; the ſwelling of the ſhoulder was wholly gone; and that of the whole arm and hand was yet much more abated, as well as the redneſs and pain. And not to leave the cure imperfect, though the patient found himſelf exceedingly amended, we gave him the next day another ſuch doſe again, and the day following one more, whereby the whole ſwelling, all the redneſs, and all the

pain

pain of the arm, hand, and the finger itſelf, were diſſipated; Mean while there was applyed to the finger a little plaiſter to cicatrize the inciſions, that had been made there, and which were healed three or four dayes after. Which did not hinder the Patient to goe abroad, and to doe his buſineſs, as well as if he had never been bitten by the Viper.

Thoſe that ſhall read this Hiſtory, and examine all the circumſtances of it, the ſeveral and ſurpriſing accidents of the biting of the Viper, which we ſaw, and the effectual operation of the remedies, employed to remove them, will therein find ample matter to exerciſe their reaſoning upon, and will ſoon judge, that we had cauſe, accurately to inquire, as we have done, into all the parts of a Viper, *to* know them well, and what they can doe; *to* make a great number of Experiments upon all its parts, and *to* apply ourſelves to the preparation of the excellent remedies, that may be drawn from the body of this Animal.

The Extraordinary effect of its Volatil Salt, in ſtopping and in overcoming, firſt of all the Venome, which ſo violently ex-

erciſed its tyranny over the natural heat, and all the noble parts, and which doubtleſs would have altogether triumphed over them: the activity, penetration, and force of the ſame Salt, going to find out the poyſon, and expelling it from the remoteſt parts of the body, where it had fortified itſelf, and whence it endeavoured to regain the place it had loſt, and where, in the mean time, it ſeem'd to deſpiſe the ordinary moſt powerful remedies. All this, I ſay, is ſufficient to make it to be wondred at; and men will, doubtleſs, averr, that the ill, which Vipers are able to cauſe, and which every one may eaſily avoide, is nothing in compariſon of ſuch a remedy, as the ſame Vipers can furniſh, and which may ſerve, not onely to heal their bitings, but alſo to overcome many other obſtinate diſeaſes, againſt which the ordinary remedies perform nothing; not to ſpeak of many other good preparations, made of Vipers, which we intend to deſcribe hereafter.

EXPE-

EXPERIMENTS
Of the Biting of Vipers, upon other Animals.

CHAPT. II.

Experiments upon Dogs.

THE effects, that are ſurpriſing, are wont ſenſibly to touch the Minds of Men; and they are they, which excite the Curious to inquire into the Cauſe of them; and although *this* do alwayes precede *thoſe*, yet it would not be known, and we ſhould not ſo much as be aware that it was, if the effects thereof did not firſt appear. Being therefore to treat of the Biting of Vipers, we hope, it will not be thought amiſs, if we begin with the recitation of the Experiments, by the Examples of its effects. And not

to be tedious to the Reader; having reviewed all that hath been experimented at my houſe, both the laſt and this year, I ſhall confine my ſelf to what I think deſerves moſt to be communicated, what ſerveth moſt to our purpoſe, and what may give moſt ſatisfaction to the Curious.

One of the moſt conſiderable Experiments was made on a *Dog*, which was bitten by an angred Viper at the upper lipp. The dog was not much moved at it at firſt, but little by little grew ſad, and his jaw began to ſwell: a little while after he vomited up the laſt food he had taken, and dunged. Then ſome bread, fleſh, and water being offred him, he would touch none of it, he remain'd in a proſtrate poſture without complaining, the place of the pricking waxed livid, and this lividneſs extended it ſelf to the neck, and as far as the breaſt, as did alſo the ſwelling. At length he dyed, but not till fourty hours were paſt after the biting. His belly appear'd not ſwoln, and without we obſerv'd nothing extraordinary but the tumour and lividneſs in the part prick't, and thereabout. The Dog being opened after his death, we found in the tronc of the

the *vena cava* a little bloud curdled, and we noted, that the reſt of the bloud, in this place, in the heart, and every where elſe, was of a dark colour, and of a very ill conſiſtence, as if it were blood in part diſſolv'd and corrupted. The Stomach appear'd of a darkiſh colour, but the Meſentery and the Gutts were darker. We found no alteration in the Heart, Liver, Lungs, nor the Spleen; all theſe parts being of a very fine colour, and in their natural condition.

The Biting of a Dog at the Ear.

THis Dog howled from the time he felt the biting, and continued his howling for half an hour; then he ceaſed to howl and to complain. The place prick't wax'd livid, and ſwell'd, as alſo did the Neighbouring parts. This dog vomited not, but voided ſome excrements, which ſeemed natural. He would neither eat nor drink, no more then the firſt, and he ſoon dyed, having liv'd no longer then twenty four hours after he had

had been bitten. We ſaw outwardly nothing un-common, but the lividneſs and ſwelling at the neigbouring part, and thereabout. But having opened him, we found all the inward parts in the ſame condition with thoſe of the former dog. 'Tis true, we did not finde in this dog any coagulated blood, neither in the heart, nor the *vena cava*, nor elſe where, but it was of an obſcure colour, and of an odd conſiſtence, and in a viſible diſpoſition to coagulate.

Another biting of a Dog.

WE had a Dog bitten by an irritated Viper at the tip of his Noſe, the dog howled, when he felt himſelf bitten, but was ſoon appeaſed, falling to lick the place prick't, and to ſcratch it with his paws. He lay not down, but continued for ſome time in that exerciſe, and went up and down in the chamber. The place bitten became ſomewhat black and blew, but ſwell'd not; and a little while after the dog drank and eat, as if he had never been

been bitten: The lividneſs diſappeared little by little, and the Dog was as well as ever.

The Biting of a little dog.

A Yong Puppy, but 7. or 8. dayes old, was bitten in the leg by an enraged Viper; the dog began to howl as ſoon as he was bitten, and ſo continued till he dyed, which he did one hour after. The part pricked was ſwelled and livid, as in the former, and the animal being open'd, we found nothing extraordinary in his body, ſave onely ſome lividneſs in the Stomach and Gutts, and ſome blackiſhneſs and ill conſiſtence in the bloud, as in the others; for all the other inward parts appear'd to us very ſound.

Another biting of a Dog.

WE cauſed alſo another Dog to be bitten under the Belly by another an-

angred Viper. He howled presently, but that lasted not long. The place bitten swelled much, and was very livid, and the tumor and lividness reached over all the natural parts. This Dog drank often, but would eat nothing, and was alwayes in this condition without growing worse. Two dayes after, to be more certain of the thing, we caused him to be bitten again, and that twice, near the same place, where he had been bitten at first. He again howled much, and the swelling increas'd, and extended it self over the whole belly, as well as the black and blew colour; but it went no further; for the dog often licked his wounds, and drank store of water, and at last fell to eat, so that without any other remedy, but his tongue, all the swelling and blew colour vanish't in five or six daies. And the dog was in the same condition, he had been in before he was wounded.

Another Dog bitten in the Tongue.

THis Dog gave us some trouble; for he defended himself a great while, be-

before he would let out his Tongue; but yet at laſt he received therein a deep bite by an enraged Viper. At firſt he howled extremely, ſo as to be heard afar off, and ſo continued, toſſing and tormenting himſelf for half an hour together, and then dyed. We opened him alſo, and although the Heart, Liver, Lungs, and Spleen were in a very good condition, his tongue was exceedingly livid; his meſentery cover'd all over with black ſpots, ſome of which were blacker then lentils, under which there was coagulated blood; the Stomach and Guts were alſo blacker than thoſe of all the others. The bloud very black, and beginning to coagulate in the heart, and in the *vena cava*, being alſo of the conſiſtence of bloud curdled and corrupted.

This laſt Experiment gave us great ſatisfaction, informing us fully of the effects of the venomous biting of a Viper, and ſhewing us, that the poyſon goes not directly to the noble parts, ſeeing we never obſerv'd any alteration therein, but that 'tis chiefly the bloud it works upon, ſince it corrupts the ſubſtance thereof, coagulateth it, or ſeparateth its parts, diſturbs

its

its circulation; and at the ſame time hinders the communication of the Spirits through the whole body, depriving the noble parts of them, as well as of the pure bloud, which was wont to bedew them, and deſtroying them indirectly, by cauſing this privation of Spirits and of the good liquor, whence depends their ſubſiſtence.

We alſo found thereby that the progreſs of the venom of a Vipers biting principally depends from the place bitten, and from the bigneſs of the veins or arteries, which the teeth hath lighted on. For, the tongue of the Dog being full of veins and arteries, 'tis no wonder, if the Venom, meeting with them, and finding in them a large way, very ſhort and very free to triumph over the bitten animal, did ſoon produce its effects, and cauſed death much more ſpeedily, than that, which met only with ſmall, ſlender and winding branches, by which its way was ſtraighter, more about, and longer; though it failed not to do execution at laſt; which it would have done ſooner, if the paſſage had been freer.

We may judge by the effects of the venom

nom of the Vipers biting in thoſe dogs, and eſpecially in the laſt, that the vomiting, and the extreme pains about the Navil, which befell the Gentleman, above diſcourſed of, proceeded partly from the bloud which was coagulated or diſpoſed to coagulation in its courſe, and which could not freely circulate; and partly from this, that the ſpirits, which accompany the bloud in the circulation, finding obſtacles in their paſſage, endeavoured to make way for themſelves, and to that end, doing violence to the lateral parts in their way, cauſed in thoſe places the extreme pains, which the Patient felt there; which might alſo be augmented by the bloud, that probably was coagulated out of the great veſſels, and might be diſperſed in the form of ſpots in the Meſentery, or elſewhere, juſt as in the body of the Dog.

We may conclude alſo, that the cold ſweats, the convulſions and the faintings, wherewith the Patient was moleſted, came from nothing elſe, but the defect of the ordinary commerce of the ſpirits with the noble parts, and from the goodneſs and purity of the bloud deſtinated to bedew them.

Con-

Concerning the ſucceſs of the remedies employed to cure the ſaid Gentleman, we ſhall declare our thoughts thereof in the ſequele of our Experiments, after we ſhall have given proofs ſufficient to ſupport them.

As to the Dogs, that were cured by licking the wound, I think that that was a good means to recall and draw back the venom; and I am much of their opinion, who believe, that if the perſon bitten, or ſome friend for him, ſhould for a good while and ſtrongly ſuck the wound, it would be cur'd, provided that the teeth of the Viper have not lighted upon ſome great veſſel, whereby the progreſs of the venom may prevail over the force of ſucking. I am alſo perſuaded, that theſe ſucked and recall'd Spirits are incapable to annoy him who ſucks them, partly becauſe they have been weakn'd by the action they have been upon, partly becauſe they are then deſtitute of the inſtruments proper to convey and ſecond their action, to wit, the teeth of the Viper.

CHAP.

CHAPT. III.

EXPERIMENTS

Of the Biting of Vipers, made upon Pigeons and Pullets.

THE Experiments made upon *these* Animals have likewiſe been very uſeful to us, to know the effects of the Biting of Vipers, which have been very like in both.

We cauſed a *Pigeon* and a *Pullet* to be bitten by a vexed Viper, almoſt at the ſame time, in the moſt fleſhy part, namely in that under the breaſt. We ſoon after obſerved in both a very thick and extraordinary beating of the heart, which went on ſtill increaſing, and in ſuch a manner, that both Pigeon and Pullet were dead in leſs then half an hour. We ſoon opened them, and found in both of them a little bloud coagulated in the heart and the *vena cava*, and all the reſt of the bloud blackiſh, diſpoſed to curdle, and as 'twere turn'd and

corrupt; but the Heart, and Liver, and all the inward and outward parts of a very good colour, and in a very good condition, ſave that a little lividneſs appear'd upon the place bitten.

We have frequently obſerv'd the ſame thing in many Pullets and Pigeons: But it will not be amiſs, here to relate the different ſucceſs in two Pigeons, we cauſed to be bitten equally and in the ſame place by an angred Viper. One of them we made to ſwallow the weight of about half a crown of Theriack, a moment before it was bitten, giving nothing to the other. The former being bitten, went to and fro in the room, ſo as not to ſhew any ſign of illneſs, but the latter was dead in leſs than a quarter of an hour We afterwards cauſed the former to be bitten again in the leg; and then it grew ſick by little and little, and dyed half an hour after. We found the place of the firſt pricking much more livid, then that of the Pigeon, which dyed in a quarter of an hour; and even more then the place of the leg, which was bitten afterward. We judged, that the vexed ſpirits unable to penetrate into the body, defended by the Theriaque, had wrought

wrought upon the outward part, and round about the place bitten, where they had coagulated the bloud, and cauſed the lividneſs; whereas the like ſpirits, having met with no reſiſtance in the other Pigeon, had gained and wrought upon the inner parts, having left and as 'twere deſpiſed the place, at which they were entred. We alſo wondred not, that the Theriaque, which had vigorouſly repulſed the Spirits introduc'd by the firſt bite, could not reſiſt the latter but for half an hour, and that at laſt it was forced to yield, in regard that the number of the enemies was great, and being weakn'd by the conflict, it had but now endured, had not force enough to bear up againſt the new aſſault of the latter.

We did alſo prick ſeveral times, and pretty deep, dogs, pigeons and pullets, with the long teeth of Vipers, ſome pull'd out of the throat of dead ones, others out of ſuch as were alive. There was alſo one of the company, who handling a dead vipers head, had a mind to prick his finger, and actually did ſo, with one of the great teeth, ſo that the bloud iſſued. I alſo my ſelf thruſt into my hand one of them, and ſo deep, that a piece of it remain'd more

than half an hour in my fleſh; but in all this we found not the leaſt appearance of venom, nor any ill, but ſuch, as might be cauſed by the pricking of a Pin, or ſome ſuch thing.

We alſo deplum'd a Pigeon at the moſt fleſhy place, and holding with both our hands the jawes of a Viper open, and making her raiſe her great teeth, we preſſed both the jawes at once againſt that fleſhy part, and cauſed the teeth deeply to enter into it, and order'd the matter ſo, that the yellow liquor of the Gums had time enough to paſs into the wounds, which the teeth had made. We at the ſame time ſaw, that the bloud iſſued out of the wounds, and mingled it ſelf with the yellow juyce, which remained there. We had then ready a little ſtone, come from *Portugal*, which thoſe of that Country call the *Snake-Stone*, being pretty black, ſhining, roundiſh, and flat, about the bigneſs of a French piece of five *Sols*, but three times thicker; which we preſently applyed to the place bitten, which was cover'd with bloud, and with the yellow liquor mingled therewith. The ſtone immediately was faſtned to the wound, and we perceived nothing,

extra-

extraordinary in the Pigeon. We might have believed, that this ſafety of the Pigeon was due to the vertue of this Stone, which they would aſſure us was infallible againſt the bitings of Vipers and all kinds of Serpents, if we had not ſome dayes before tryed the like Stone upon a Pigeon, bitten in the ſame place by an angry Viper, and if that wound had not been follow'd by the death of that Pigeon, a quarter of an hour after. We thought, this very well deſerved another experiment; and having ſtill the ſame Stone by us, which ſeem'd to have ſaved the former pigeon, and ſuch another, which the Lord Ambaſſadour of *Spain* had truſted his Phyſitian with, we by one and the ſame enraged Viper cauſed to be bitten two Pigeons of equal bigneſs and fleſhineſs, each in the ſame place, well freed from its feathers. The bloud was ſeen upon both wounds; but there appear'd but little of the yellow liquor. We ſoon applyed both the Stones, one to each Pigeon; they preſently ſtuck faſt to the places pricked; but we ſaw immediately in both a very high and thick beating of the heart, which was follow'd by the death of both Pigeons, which hap-

ned at one and the ſame time, in leſs than a quarter of an hour.

We had alſo a mind to know, whether the Venom, that had ſo much force upon the bloud, were alſo able to make ſome ill impreſſion upon the noble or ſolid parts of the bitten animals, which parts appear'd to us very fair and very well conditioned. We gave alſo a Pigeon, dead of a Vipers biting, to be eaten by a Cat that was very lean, which fed very greedily upon it; and the ſame did afterwards eat many more, and Pullets alſo; upon which ſhe grew very fat, ſo far was ſhe from finding any inconvenience thereby.

Moreover we had a deſire to learn, whether one and the ſame Viper was able to kill by its biting divers animals wounded, one preſently after another; and whether the Venom was exhauſtible, ſo that the animals, bitten laſt, might be free from its miſchievouſneſs. To know the truth hereof, we cauſed to be bitten five Pigeons one after another, by the ſame Viper, which we angred every time ſhe was to bite: All theſe Pigeons ſoon dyed; and we particularly obſerved, that the laſt bitten dyed firſt of all. And as to the Bloud,

and

and all the inward and outward parts, they were in a manner alike with those of the Pigeon, that was bitten first.

The various Experiments, we have been relating, do insensibly oblige us to deliver our thoughts concerning the Venom of Vipers, and its operation. We think this to be a proper place to declare ourselves here, and afterwards to employ the rest of our main experiments for the defence of what we shall have advanced upon this Subject.

CHAP. IV.

Of the Venom of a Vipers Biting, and its Operation.

THE Antiens, prevented by the opinion, that there were very few parts in a Viper, that were exempt of poyson, have but very slightly examin'd them. And as they esteemed that the Choller of the Viper did much con-

tribute to the Venom, believing, that the ſeat thereof was in the Gall, they there alſo ſetled that of the poyſon, and imagined, that the taſte of the Gall, very ſharp and very bitter, was an argument of its malignity, and that the veins and arteries, which paſs near the Gall, and may be followed as far as into the jawes, and appear the ſame through the whole body, above and below the Gall, were the pipes, which Nature had purpoſely form'd to carry the juyce of the Gall into the Gums, and that it was that liquor, which cauſed all the mortal Symptoms, and death it ſelf.

But they have not conſidered, *that* this Choler of the Viper reſideth not in the Gall; *that* the Galls of innumerable other Animals have a taſte very approaching to that of a Viper, and yet are not venomous; *that* the veins and arteries, which paſs near the Gall, and ſeem to part thence and extend unto the Gumms, and all the parts of the Body, are veſſels deſigned, onely to convey the blood, which have not their origin in the Gall, and which cannot carry a juyce, which they could not receive: *that* there is not any taſte

taſte of Gall in all thoſe imagined Veſſels, no more than there is in the liquor of the Gums, nor in all the reſt of the Body above the Gall: and *that* in the whole Bladder of Gall there is but one veſſel, that is any thing conſiderable, though it be very ſlender, which iſſuing, as we have ſaid, from the internal ſide of the upper part of the Gall, dēſcends (ſo far is it from aſcending) and diſcharges it ſelf into the firſt inteſtine, according to the deſcription we have made of it, and conformably to the Figure, that may be ſeen in the *Cut*.

But not to ſtay upon principles ſo ſlightly eſtabliſh't, and ill maintain'd, foraſmuch as we have on our ſide a great number of Experiments, upon which we are grounded; We ſay, That the *Gall* of a Viper is not at all Venomous, but *that* on the contrary it contains a Vertue, that is Balſamick and cleanſing, and very proper for many good uſes; *that* there is no Veſſel, which carries its juyce to the Veſicles, that are about the great teeth; *that* the yellow liquor, therein contain'd, is in all things very different from that of the Gall, excepting that they are both equally free from Venom; *that* that yellow liquor is gather'd,

ther'd, and form'd by the *Salival Glands*, above deſcribed; *that* it is carried into thoſe Veſicles or Baggs by the *Lymphatick* veſſels which part from thoſe Glands; *that* this juyce is nothing but a pure and plain *Saliva*, of which we have already obſerv'd the uſe; and *that* this juyce contributes nothing to the venomouſneſs of the Biting; ſince, being taſted and ſwallowed (as we have often experimented) it does no hurt neither to man nor beaſt; and ſince alſo, being put upon open wounds, and upon inciſions made in the fleſh, the ſame being rubb'd therewith, and mingled with the blood, it annoyes nothing at all: notwithſtanding the judgment of a perſon very intelligent, and particularly in this ſubject of Vipers, who aſſures to have made a great number of Experiments; which being contrary to ours, the great opinion we have of the abilities and the ſincerity of that famous man, hath obliged us to employ the more care and exactneſs, and to confirm ourſelves, by a very great number of Experiments, which have alwayes been found alike, in the truth, we here aſſert, and of which we ſhall make evident and irrefragable proof.

We

We ſay further, that there is no other venom in all the other parts of the Body; and more, that there is none even in the great teeth, if the Viper be not alive, and the biting not accompanied with vexed and *enraged Spirits*. The hurt, which the teeth doth, when the Viper biteth, conſiſts chiefly in that it opens a door to the angred Spirits, without which irritation the Biting of the teeth is not mortal, and ought to be no further conſider'd then for the deep and direct wound, which a tooth, ſo ſharp, ſo long, and ſo ſlender, of any other animal whatſoever, might make. In which circumſtances, the great number of Experiments, by us made, hath rendred us knowing; in regard that we have obſerved a quite manifeſt difference in the Biting of a Viper angred, from that of a Viper, which was made to bite by holding its jaws, and by preſſing its great teeth into the body of ſome animal: becauſe this forc'd action ſerves rather to make the Viper retain its ſpirits, then to let them out; for which the freedom of the animal is neceſſary, the ſpirits not being able to part, but the imagination and the Choler of the Viper

muſt

muſt immediately precede and thruſt them out. For this way of biting, by holding the jaws, and thruſting the teeth into ſome animal, although it emit more of the yellow liquor upon the part bitten, than the biting made by an angred Viper, left to it ſelf, is not followed by any ſiniſter accident, and is healed like a ſimple wound, whereas the other is attended with death, in caſe we want means of preventing it.

The effect therefore of the venom being altogether of a ſpirituous nature, and not working but according as the ſpirits are more or leſs iritated and puſh't on, and according as they finde more or leſs free paſſage, we have reaſon to impute it to the exaſperated Spirits, having found no footſtep of it, neither real, nor apparent in all the viſible parts. But the better to maintain this our aſſertion, we ſhall here give you our thoughts concerning the action of the enraged Spirits.

Theſe Spirits then, puſh't on by the choler, which the Viper had conceived, finding the apertures, made by the Teeth, follow their inclination, and as it is their property, to advance and penetrate, they at the firſt ſeek out all wayes for it, and they

they advance more or leſs, according to the facility or difficulty, they meet with. Thence it is, that the Biting is much more dangerous, when the teeth light upon the greater veſſels, than when they only light upon Fleſh, or the little branches of the veins and Arteries. So that the vexed Spirits of a Viper, meeting with the bloud and Spirits contain'd in the veſſels of the bitten animal, puſh and preſs them to make way for themſelves, and embaraſſing the particles that compoſe the bloud, cauſe there a coagulation or confuſion, which diſturbs the ordinary Circulation, and by this means hinders the communication of the Spirits, to the principal parts, from which depends their ſubſiſtence and life. And by reaſon of this privation they muſt ſuccumbe, either for having been attack't in their fort by theſe vexed Spirits and infected by them, or rather becauſe theſe ſpirits of the Viper have made themſelves maſters of the *avenues*, and obſtructed the paſſages, by which the blood and the ſpirits were communicated to them.

We conclude therefore, that the imagination of the Viper being irritated by the

the *idea* of revenge which she had fram'd to her self, gives a certain motion to the Spirits which cannot be expressed, and pushes them violently, through the nerves and their fibres, towards the cavity of the teeth, as into a funnel; and that from htence they are convey'd into the blood of the animal, by the opening, which they have made, there to produce all those effects, of which we end eavour to give a reason. Others, more able than we, may perhaps carry their reasoning farther.

For the rest, some have thought, that those enraged Spirits have in them a secret acidity, capable to coagulate the bloud, and to hinder the Circulation, whence the mortall accidents proceed. But since that this acidity may have been produced in the mass of the Blood by its own parts, which come to be dissolved and severed, when they are tainted by the venom, and since corruption slides into it, as into milk, which sowreth and corrupteth of it self, without mixing any acid thing therewith; it is not necessary to search for a coagulating Acid in the Spirits of the Viper, which cannot be perceived by the taste to know the truth of its existence therein; and

and that the leſs, becauſe *that* Acid may be naturally formed in the Bloud of the animal bitten, without looking for it in the Viper, as if it had come from thence.

How-ever this be, we muſt agree herein, that this irritation in the phanſy or in the ſpirits of the Viper is the main cauſe of the activity and piercingneſs of its venom, and that without it the biting would not produce ſuch ſurpriſing effects, as thoſe are, of which we have related ſo many Examples. Nor is a viper the onely animal, whoſe biting is mortal: Dogs, Wolves, and Men themſelves prove that; and not to go from our Subject, the biting of Serpents, of which the Viper is a *ſpecies*, is more or leſs malign, according to the nature of their ſpirits, and eſpecially according as they are angred and exaſperated.

It ſeems, that *Cleopatra* was well inſtructed in this matter, when ſhe, intending to kill herſelf, commanded to be brought her two *Aſpes* in a fruit-basket, and pricked them with a golden needle, which ſhe pulled out of her hair-dreſs, and made her ſelf be bitten immediately by one of thoſe Aſpes in the right arm, and by the other,

in

in her left breaſt; knowing (as a famous Author ſaith) that their natural fierceneſs, and cruelty was not ſufficient to execute well what ſhe deſired, and that it was needful, this pricking ſhould ſerve to provoke the ſpirits to bite to purpoſe, and to render the wound mortal; if at leaſt it be with *their* biting, as it is with that of our Vipers, who alſo have this particular quality, that not onely they are ſoon angred, but that in the very moment of the irritation they bite with a ſtrange ſwiftneſs; which ſpeaketh much the ſubtlety and impetuouſneſs of their ſpirits, whence depends their ſtrength and activity. We obſerve alſo, that in diſtilling Vipers bodies, we thence draw very ſubtile and very penetrating parts, and in much greater quantity, in proportion, than from any other animal.

In the mean time, the obſtacle, which theſe irritated ſpirits of the Viper give to the communication of the ſpirits of the animal bitten, nor the coagulation, or confuſion, which they cauſe to the bloud, are not of that force, that ſpecifique remedies ſhould not maſter them, and reſtore the animal unto that Condition, where-

wherein it was before it was wounded. Which is that, we ſhall prove in the ſequele by divers Experiments; where we hope to ſhew in what manner the remedies do overcome the powerful action of thoſe enraged Spirits.

CHAP. V.

EXPERIMENTS

Of the yellow juyce, contain'd in the Veſicles of the great teeth, made upon divers Animals.

IN the deſign, we had, well to try all things, we purſued our Experiments, and to be well aſſured of the quality of that yellow liquor, which hath been believed ſo dangerous, we cauſed to be bitten, by ſix angred Vipers, ſe-

parately and ſeveral times by each of them, a ſlice of bread, and ſo much, that it had well exhauſted and retain'd all the yellow liquor, contained in the Gums of theſe ſix Vipers: At the ſame time we gave this ſlice of bread to a faſting Dog, to eat, who was no more inconvenienced thereby, than if he had eaten a piece of dry bread, that had imbibed nothing of this juyce.

We have alſo often made divers Pullets and Pigeons to ſwallow pieces of bread dipped in the ſame liquor; and we can aſſure, that none of theſe animals had any miſchief thereupon.

I my ſelf had the curioſity to taſte of this juyce, which I have divers times done in the preſence of many perſons, without waſhing my mouth before or after. And ſeveral Phyſitians alſo have taſted of it themſelves, both to know the taſt, and to be aſſur'd of the harmleſsneſs thereof; and 'tis certain, that they were no more incommoded thereby than myſelf.

And becauſe it hath been believed, that this juyce, being thus taſted and ſwallowed by Men or other Animals, that had no wound

wound nor Ulcer in their mouths, nor in their ſtomachs, was indeed harmleſs; but that it was quite another thing, when it did accompany a Biting, and entred into the openings made by the teeth and that the ſame being put upon an Ulcer, a wound, or a ſimple excoriation made on the skin, was mortal, and failed not to produce its effect, three or four hours after it had been put upon the wound; and that as well upon Men, as all other ſorts of Animals, without exception; we reſolved alſo to make many Experiments upon this account.

I can therefore ſay, in the firſt place, that I have taſted of it my ſelf, at ſuch times, when my mouth was excoriated, upon which I obſerved, that even my ſpittle was a little ting'd with bloud, without having perceived any acrimony, or extraordinary heat. We alſo made a Tryal upon a Pigeon, which we wounded under the wing, and in the leg in the ſame moment of time; and we let into each wound ſome of this yellow liquor, which we juſt afore had drawn from the gums of two enraged Vipers; then we re-joyned the skin, well to incloſe the ſaid liquor, and we bound both wounds over with a

band, that nothing might run out. We can assure, that the Pigeon felt not any inconveniency from it, and that we even found upon the wound, made on the leg, a coagulated drop of the juyce, round, and of the same colour, as we had put it there, and the bloud of the place dryed, and that, soon after, both wounds were dryed up, and heal'd of themselves.

We also made the like Experiment upon a Cat, which we purposely wounded in the leg, but he received no harm at all by it. We have also often experimented it upon Pullets, and other Pigeons, but alwayes with the like success, and without any offence to the Animals.

The same tryal hath been thrice made at three several times, and even twice in one day, upon a dog, whom we had wounded on purpose towards the bottom of the Ear, where he could not lick his wound; and no mischief at all followed upon it.

We cannot but adde here an Experiment of the mortal effect of the enraged Spirits, without any intervention of the yellow liquor. We made a Viper several times to bite upon a slice of bread, by pressing every time its jaws against the bread,

and

and we did this ſo often, that not only that juyce was altogether exhauſted, but that the bloud began to come out of the gums. At the ſame time we vexed the Viper, and made it bite a Pigeon in the moſt fleſhy part; and we obſerv'd, that indeed the effects of the venom of the biting were not ſo quick, the Pigeon not dying but an hour and an half after it had been bitten; but then we found alſo, that the teeth of the Viper were in a manner cover'd with the crums of the bread, from the force of its having bitten at it, and that that had hindred them from making a deep entrance, and that having half ſtop'd up the pores of the tooth, a good part of the angred Spirits could not come forth; ſo that the death of the Pigeon could not follow ſo faſt, though yet it hapned without any mixture of the juyce which had been altogether emptied.

CHAPT. VI.

EXPERIMENTS

Of the Gall, Eggs, Inteſtins, Head, and Bloud of Vipers, made upon divers Animals.

WE have made ſeveral Dogs and Cats to ſwallow the Galls of Vipers, ſometimes whole, ſometimes burſt, and diſſolv'd in ſome liquor, and ſometimes ſix, ſometimes ten, ſometimes a dozen at a time; but they never found themſeves ill after it, no more than the Pigeons and Pullets that had ſwallowed ſome of it, and which we had alſo wounded, and afterwards rubbed with the Gall of a Viper: for this Gall ſerved them for a Balſom, the wounds being the ſooner cured thereby; ſo that we can juſtly declare the gall

gall to be free from all venom, as well as the yellow liquor; and even inculcate here what we have already ſaid, that the galls of Vipers have particular vertues in them.

We can ſay the ſame of the *Matrix* and Eggs of a Viper, and of all the Inteſtins, of which we often have made good quantities to be ſwallowed by Doggs and Cats, ſome of which have eaten thereof with greedineſs, when they could light upon't; and none ever hath felt any trouble after it. On the contrary, we have tryed, that having cauſed to be bitten, at the thickeſt place of the Ear, by a ſufficiently vexed Viper, a young Cat, very lean, that had but juſt before eaten the Eggs, the *Matrix*, and all the guts of a Viper; the biting had almoſt no effect, and there appeared nothing but a very little ſwelling, and a very inconſiderable lividneſs in the place bitten.

We have further made many Dogs and Pigeons ſwallow the Heads of Vipers, newly cut off, and yet living, having only cut with Sizers the point of their great teeth, leaſt in paſſing down they ſhould bite the throat, or the inward parts of the animals, that were to devour them; but

we have not obſerv'd any thing after it, that was extraordinary, in all thoſe creatures.

We had alſo a deſire to find, Whether a Viper, being eaten by an Animal, which it had bitten before, would be cur'd of that biting. We therefore cauſed to be ſlightly broyled the head of a Viper, which had on it a part of its neck, newly ſever'd from the body; and we made a Dog to be thrice bitten at the Ear by a well enraged Viper, in ſuch a manner that the bloud came out at the three places pricked. We ſoon caſt before him the head and neck, broyled, and yet hot. The dog, that was hungry, and felt not ſo ſoon the effects of the bitings, immediately ſeized on the head, bruiſed it between his teeth, and ſwallowed it down: after which we ſtayed a pretty while to ſee, whether the three bitings would prevail over the devoured head and neck; but the Dog was free, except ſome blewneſs and a little tumor, he had at the places bitten, but which little by little vaniſh't in three or four dayes.

We made alſo a dog to be bitten three times in the ſame place, and without broyling the head of the ſame Viper that had

bit

bit him, we caſt it to him, hoping that he would eat it, becauſe he had not eaten any thing for many hours before; but the dog would not touch it. Upon that we bruiſed and ſtamp'd that head in a mortar, and ſo cramm'd it down the dogs throat; rubbing alſo the bitten places with the bloud of the ſame Viper: which done, we expected the ſucceſs; which was, that this head, raw and bruiſed, and if you will, aſſiſted by the blood of the Viper, being applyed to the part bitten, had produced the ſame effects with the former, which had been ſo ſlightly broyl'd; in regard that this dog was free, excepting thoſe inconveniences the former ſuffer'd, and was, after that as ſound, as if he had never been bitten.

If theſe two Experiments had been made, before that Gentleman, above diſcours'd of, was bitten by the Viper, we ſhould have been in much leſs anxiety for his preſervation. But it was enough, that we were able to ſecure him from the dangerous effects of the biting, by wayes grounded upon reaſon, and by remedies, that were more proper for ſuch perſons, as could not well reſolve to eat the bare fleſh of Vipers.

CHAP.

CHAPT. VII.

Several other Curious Experiments made upon Vipers.

WHereas we gave but little credit to what divers Authors have assured to be true, namely, that the Head of a Viper bruised and applyed to the biting of it would heal the same; we made a Pigeon to be bitten in the most fleshy part of its body, well freed of its feathers, and we cut, bruised, and applyed to the place bitten, the head of the same Viper, that had wounded the Pigeon, and took care to have it held upon it with a hand. We also cut the head of a living Viper, and had it slightly broyl'd, then bruis'd and laid hot to the wound of another Pigeon, which had been newly bitten in the same place, to find, whether by the heat of the broy-

broyling, the parts of the head being more open'd, and the ſpirits more ſet at liberty, they would work better; but the ſucceſs was not more beneficial for one Pigeon, than the other; for they both dyed half a quarter of an hour after they had been bitten; and their bodies being open'd, we found in them, what we did in others, kill'd by Vipers, namely a blackiſh blood, in part coagulated, and half corrupted, in the heart and the great veſſels; but we took notice, that there was leſs black & blew about the place bitten; which was perhaps all the effect, that theſe bruiſed heads had produced, which had not been able to carry their virtue any farther.

It is not ſo, (to ſay that on the by) with the pricking of a *Scorpion*, which being bruiſed on the part ſtung, ſerves for an Antidote, and cureth: for which this reaſon may be alledged, that the venom of a Scorpion, not working ſo briskly, and not piercing with ſo much quickneſs unto the inward parts; the Spirits, that iſſue from the bruiſed Scorpion, have leiſure to make way for themſelves, and to go and find out the venom, to joyn with it, and to make it come forth; whereas the venom

nom of the Viper goes immediately to taint the maſs of the blood, and the parts which it bedeweth; as was apparent in our Gentleman, who had no pains nor ſwelling in his arm, but after all the other accidents; contrary to the operation of the Scorpions Venom, which, before it paſſeth further, acteth upon the part prick'd by benumming, cold, and tenſion, or by inflammation, and very great pains; as thoſe Authors, that have written thereof, and the perſons, that have been prick'd by them, doe aſſure.

We have found very true, what Signor *Redi* hath ſaid of the effects of the Eſſence of *Tobacco* upon Vipers; That, running their skin through with a thred dipp'd in that eſſence, and leaving the thred in the skin, the Viper dies in leſs than a quarter of an hour, and becomes as hard as braſs, but ſoon after ſupple and plyant. We have alſo tryed, that a little piece of Tobacco in the roll, held in the throat of a Viper, and the ſmoak of Tobacco blown into its throat produce the like effect, but a little more ſlowly; and that both do cauſe convulſions, and extraordinary contractions in a viper, which are attend-

ed

ed with death; and that, when all the other parts of the body are deprived of motion, the heart yet beats about half an hour after; and that Tobacco, or its eſſence, kills Snakes as well as Vipers. I know not, whether this will do with other animals, ſince, having run a thred dipt in the eſſence of Tobacco, into the skin of the under-belly of a Dog, he immediately howled very much, and continued ſo to do for half a quarter of an hour, running round, then lying down, and then riſing again, and in the mean time purging above and below, and voyding excrements more liquid then ordinarily. He would eat nothing, and onely drunk now and then a little, after which he vomited; but this was all the trouble he had, which inſenſibly went away, and ſoon after, without any other accident.

We have vexed a viper, and made it to bite another viper, which on purpoſe we held within the reach of its teeth. But although ſhe open'd her throat, and put her ſelf into a poſture of biting, yet ſhe refrained, and ſunk not her teeth deep into the body of the other; which moved us to thruſt them our ſelves by preſſing her jaws;

but

but the bitten viper received no inconvenience from it. Yet we have obſerved, that a viper which was made to ſwallow ſome of the eſſence of Tobacco, and which we yet held by the neck with pincers, did bite herſelf; but as the eſſence alone failed not to kill her, ſo there was no reaſon to impute her death to this kind of biting, which was probably an effect of the convulſive motions cauſed by the eſſence of Tobacco.

We alſo pierced twice, in the day-light, with the point of a pen-knife, the head of a live viper in the midſt of the Brain, from the top to the botom; one thruſt long-wayes, the other croſs-wayes, and in ſuch a manner, that the blood run out both above and below; but notwithſtanding, the viper, being let looſe, crept about as before, and as if ſhe had not been wounded; but ſhe ſtill loſt bloud by the wounds, and at laſt dyed at the end of an hour, but her heart did ſtill beat and continue to do ſo two hours after. Which Experiment ſufficienly argues the extraordinary vivacity of the Spirits of the viper.

We have alſo put into a glaſs-veſſel, a living

living viper, together with three live *Scorpions*, and there left them together four dayes; but found them in the ſame condition, in which they were, when we put them in, though there be Authors that aſſure, that theſe Animals kill one another, being ſhut up together in one and the ſame veſſel. Mean time a viper will kill Scorpions, as well as Lizzards, and other animals to devour them and feed upon them, but that ſhe doth only, when ſhe is at liberty, and not when impriſon'd; for then ſhe ceaſeth to take food.

We have likewiſe found the contrary to what Authors have affirm'd of the *Waſpe's* attaching a Viper, and that the former would fix its ſting into the head of the latter, and quitted her not, till ſhe were dead.

Divers Authors have aſſur'd, that all the remedies, which are reputed Alexiterial, or Preſervatives againſt poiſon, did kill Vipers, by their vertue contrary and oppoſite to their venom. To be certain hereof, we forced a Viper to ſwallow half a drachm of *Theriaque*, diſſolved in *Carduus Benedictus*-water; and having laid her aſide, we perceived not any change in her,

ex-

except that the ſurface of her skin appear'd for a while a little moiſt; but ſhe grew more vivid upon it, and more ready to bite than before.

We had alſo a minde to know the effect of *Spirit of Wine* upon a Viper. We therefore made one ſwallow about a drachme of it; which thereupon was preſently ſtun'd, and then fell into ſtrange agitations; but ſeeing that that ceaſed little by little, we gave her another doſe of the ſame quantity, which not onely caus'd in her the like agitation, but afterwards made her almoſt un-moved, and ſo inebriated her that ſhe ſeem'd to be half dead. She remain'd about three hours in this condition, but at length ſhe began to ſtir again, and was like the former, more brisk, and more diſpoſed to bite than before. We put alſo a living Viper into a bottle almoſt full of Spirit of wine, and we ſaw, that ſhe turned to and fro therein, now ſwimming on the top, then in the middle, and by and by at the bottom of the bottle, and that ſhe reſiſted a good hour, before ſhe was choaked therein.

We cauſed likewiſe a Viper to ſwallow ſome ſugar, part of which was in powder, and

and the other part diſſolv'd in water. She kept the whole for a while with her, but afterwards vomited it up; and having laid her aſide, to ſee, what would become of her, we found her dead four and twenty hours after.

We have often ſpit into the throats of many Vipers, even when we were faſting, but they ſoon after caſt up our ſpitle, and had not any hurt thereby; though there be Authours affirming that Vipers become tabid or conſumptive thereby; which yet may very well happen, not from thence, but rather from the abſtinence and ſadneſs, after a long impriſonment.

Many Authors have mentioned, that Vipers have a great Antipathy to *Aſh*-wood, and that, if a live Viper were put within a round, made, one half, of the leaves of Aſh, and the other half, of kindled coales, the Viper would rather expoſe herſelf to be burnt, then to come near the Aſh-leaves. But having made a whole round of ſuch leaves, which had about three foot in diameter, we put a Viper in the midſt, which preſently hid herſelf under thoſe leaves.

Whileſt I had live Vipers in my houſe,

ſeveral Women with child came to me, ſome deſignedly to ſee them, others without having any ſuch thought, and even being ſurpris'd at, and abhorring the ſight of them; but none of them having been inconvenienced by it; ſo far were they from miſcarrying thereupon, as certain Authors would beare us in hand they would do. Not that ſuch a thing may not chance to happen to ſome woman or other extraordinary fearful, and of a temper ſo delicate, that a much leſs occaſion might produce ſuch an effect; but that ought not to paſs for a general rule.

We have often preſſed ſome Vipers, both Males and Females, at the place, where be the *Paraſtates*, or the Bladders containing the ſeed, namely under the tail, and near the openings, which ſerve for generation; and have ſo much and ſo long preſs'd them, that a white liquor came forth; but we never perceived there any piercing or ill-ſented ſmell, no more than we did in opening thoſe *Paraſtates* with a lance, though we held our noſe cloſe to it: which is alſo directly contrary to what ſome Authors have aſſured thereof.

CHAP.

CHAPT. VIII.

GENERAL REFLEXIONS

Upon all we have experimented.

THE great care and attention uſed by us in the Experiments, we have hitherto deſcribed, and in thoſe, we have thought fit to ſuppreſs, hath made us to profit of all the occaſions, that preſented themſelves; and we have taken pleaſure to obſerve all the effects, that have appeared to us, and carefully examined them, and inquired into their cauſes afterwards, that we might make our reflexions thereon.

The Biting of the Viper, which hapned to the Gentleman Stranger, began to furniſh us with much matter; and at that time we knew the Venom by its effects, which ſeem'd to proceed from a very ſlight cauſe, it being nothing but a little pricking, and onely the cut of a tooth, which was not any thing deep, and the ill of

which did not ſeem to us increaſed by any of the yellow liquor of the Gums, the innocence of which was not yet fully known to us. In the mean time the mortal Accidents came on in great number, whilſt continued vomitings hinder'd the effect of the remedies, which could not be kept in the Stomach, to communicate from thence ſome of their vertue to the parts affected. It was well enough known, that there was ſomething very ſubtile, very quick, and very powerful in this Venom; and it was alſo preſumed, that that reſided in the Spirits; but the nature of it, or by what means, or how, or on what parts it acted, was not known ſo well.

Yet we muſt avow, that on an occaſion ſo preſſing, ſo dangerous, and ſo extraordinary, we could not take our meaſures better than by having recourſe to the Volatile Salt of Vipers. The cauſe being ſubtile and ſpirituous, there was required a remedy of the like nature, that might be able to make haſte to finde it out, to joyn with it, and to draw it to the extremities of the body, and to make it come forth by the wayes, it had opened for it. But then, the continual vomiting demanded the

the aid of ſuch a remedy, that could work in a moment, or execute at leaſt by ſeveral takings, what it was not able to do at the firſt. The happy ſucceſs, which attended the uſe of this Volatile ſalt of Vipers, acquainted us with the ſufficiency thereof, and ſhowed us the maſtery it had over the malignity of thoſe Spirits. It alſo begot in us a deſire to know aright, in what manner it produced ſuch good effects, and to be enabled ſo to diſcourſe of it, as that others might have no reaſon to reject our ſentiments.

We eſteem therefore, *that* this Salt, by its ſubtile, volatile and piercing quality, is very proper to diſſolve the coagulations of the Bloud, and to ſever the parts, which therein were congeal'd or fix'd, (if we may ſo ſpeak) and caus'd the diſorder and confuſion of its motion; *that* it performed this in the Blood of the ſaid Gentleman, which it reſtor'd to its former condition, and ſo gave again to the parts the free communication of the Spirits, which they had loſt. We believe alſo, that this Volatile Salt, by the facility it had to hook and faſten it ſelf unto thoſe vexed Spirits, as being of the like nature,

did easily joyn with them, and drove them to the extremities of the body, drawing them forth through the pores of the skin, and issuing out with them by the way, it had open'd for them.

The Ligatures made about the place bitten, the Scarifications, and the approach of the well heated iron-spatuls to the wound, were to serve to stay the impetuousnes of those irritated Spirits, and to give them an out-let at these openings, rather than that they should go farther: And the exhibition of the Theriaque, the Viper-powder, and the like, was to conduce to drive them back, as it might have done, if these remedies had stay'd in the Stomach. As also the *Epithemes* of Theriaque upon the Heart and Stomach might have serv'd much, if the action of the enrag'd spirits had been more slow, and if at the time of their application those spirits had not been too farre advanced.

But the Use of this Volatile Salt was to carry the Bell, as it did, from all the other remedies; and those, that were employ'd afterwards and in the intervals of its exhibition, were nothing, if we may so

ſo ſpeak, but Souldiers aſſiſting their Captain; ſuch as the Confection of *Alkermes* and of *Hyacinthe*, which were very proper to fortify the noble parts; as alſo were the Syrup of Limons, and the Decoction of Scorzonera, and the ſhavings of Ivory.

The Slices of Citron, which might ſeem to ſome by their acidity capable to augment the coagulation of the blood, were not given till after the Volatile Salt had uſed its force to diſſipate it; and they ſerved to recover the Stomach, debilitated by continual vomiting, and by their acidneſs to reſtore the loſt appetite, and to help the concoction of the aliments, and their diſtribution into the parts, that had need of them. Beſides that Citrons have a ſpecifique vertue againſt the poyſon of Vipers, if we will believe thoſe Authors, that have written of it; and is a great friend to the Heart and the other noble parts.

The Anointing with the Oyle of Scorpions of *Matthiolus*, and with the water of the *Queen of Hungary*, made upon the ſwell'd parts, and the application of Alexiterial fomentations, ſhould in all appearance have ſerv'd much; but the ſequele

ſhew'd, that there was nothing but that Volatile Salt, which could make thoſe angry Spirits ſurrender, and ſo was to take the honour of all.

The Experiments, which we afterwards made upon a great number of differing Animals, have given us a much greater knowledg of the effects of Vipers-poyſon, of the parts on which it works, and of thoſe that ſeem to be exempt from it, though at laſt they do ſuccumbe: We have ſet down the moſt conſiderable of them, making ſome reflexions on the biting of ſeveral Doggs, done by Vipers; but there remain'd ſtill for us to diſcourſe, Why and How the parts of Vipers, being eaten, can ſtop and overcome the Venom of their biting.

We ſay therefore, that all the parts of a Viper abound chiefly in Volatile Salt, which in diſtillation is found partly alone; partly in the form of a Spirit, which properly is nothing but a Salt diſſolved in ſome portion of Phlegme; and partly in the form of an Oyle, which alſo is but a Salt mix't among the unctuous part of a Viper. We ſay alſo, that in the digeſtion, made in the Stomach, of the parts of a Vipers body

body, that have been ſwallowed down, this ſame Volatile Salt, which they contain, is ſeparated, and afterwards diſtributed to all the parts that need them; eſpecially if of theſe parts there have been ſwallow'd enow, to furniſh that quantity, which is neceſſary, of this Salt; and ſo we need not doubt, but that this Salt will produce an effect like that of the Volatile Salt, which was given to our Gentleman bitten; Unleſs it ſhould be ſaid, that this ſame Volatile Salt of thoſe parts of a Vipers body, which have been ſwallowed, being of the ſame nature with the irritated Spirits, attracts them to it ſelf, and by this union changes their maligne quality, and ſo tames them, that they have no power over the bitten Animal; which, in my opinion, is hard enough to conceive, and perhaps eſtabliſhed upon unſolid foundations.

We hope, that among the many Experiments, thoſe of the Five Pigeons, bitten one after another, by one and the ſame Viper exaſperated, and of which the laſt bitten dyed firſt of all, when the Viper was moſt vexed, and moſt exhauſted of its yellow liquor; and that of the Pigeon bitten by

a Vi-

Viper, which we had cauſed to bite ſeveral times into bread before, and that even till bloud came forth, to the end that the Juyce might be well emptied of it, and which notwithſtanding was followed by the death of the Pigeon; Theſe Experiments, I ſay, will prove on one hand, that the yellow liquor contributes nothing to the poyſon; and on the other, that theſe incenſed Spirits, aſſiſted by the openings which the great Teeth had prepared for them, are the ſole and true cauſe thereof.

The wound, made by a Viper not vexed, whoſe jaws were held in, and whoſe teeth were at the ſame time thruſt into the body of a Pigeon, which alſo was accompanied with ſtore of the yellow juyce, and yet not attended with any ill accident; as alſo the pricking, made by the great teeth, pulled out of a live Viper, or by ſuch, as ſtuck yet in the head of a dead Viper, and did no hurt at all, do ſufficiently confirm this truth, viz. that the cauſe of the Venom is to be imputed to the Spirits enraged, and not to any other thing or parts in the Vipers body.

I have not undertaken to reaſon upon all

all the Experiments, we have made, as I have done upon the Bitings, both becauſe that is beyond the Sphere of a man of my profeſſion, and becauſe I deſigned onely to confine my ſelf particularly to the wounds and to the Remedies able to heal them.

For the reſt, if in the Treaty concerning Theriaque, which I have lately publiſht, I have advanced any thing not conſonant to what I have declared here, touching the action of the Venom, I am to be excuſed therein, foraſmuch as I had not then had the occaſion, well to know the nature and the effects of the Bitings of Vipers, and referred my ſelf to the moſt approved Authors about it. But yet all we have there ſaid, derogates in nothing from the preparation of Vipers for Theriaque, which we have there laid down, and which was in that Book our main deſign, as well as to reform ſeveral other preparations, that ſeemed not reaſonable to us: That which now remains to be done by us, is, to ſpeak of the Remedies to be drawn from Vipers, which may ſerve to heal their bitings, and to cure many other evils.

THE

THE REMEDIES EXTRACTED FROM VIPERS.

CHAPT. I.

Of the different choyce that may be made of the parts of a Viper.

THere is nothing in Nature, to which can be given more justly the title both of *Aliment* and *Medicine*, than to a Viper, since it affords equally very good Nourishment and very good Remedies. It also hath in its Body not one part, which is not very usefull, and of which Artists may not draw some-

thing

thing that is good; their chief difference consisting in this, that the substance of the one is more or less close, then that of others. Yet, as in all Bodies of Animals, there are parts preferable to others, so we may make a distinction of those in a Viper, especially if we mean to eat them, or to reduce them to powder, to take it at the mouth, alone, or mingled with other medicaments.

In this case, it will be well, to use only the Heart, the Liver, and the Trunk, I mean, the Body emptied of its guts, without head and tayle. Not that, if you would make use of the head and taile, any ill would attend it, or that you need to fear any ill quality in them, no more than in all the other parts of the body; but the Heart, Liver and Trunk are chosen, as those that are most esteem'd, and which are taken before the rest, out of the body of such Animals, which men use to feed upon. Those also, that would nourish themselves with Viper-flesh boyled and seasoned, may do well, in eating of it, to separate the bones thereof, and to leave them uneaten: but if they bruise them between their teeth,

and

and ſwallow them down together with the fleſh, they would afford them a like, and even a ſtronger nouriſhment than the fleſh: for, we have found by Diſtillation, that the Bones yield the ſame parts, that the Fleſh does and even in greater quantity. For the ſame reaſon, the Bones of the trunk are not to be caſt away, when you will prepare the powder of Vipers, and that the rather, becauſe they are in that way very eaſy to ſwallow. One may alſo very uſefully dreſs the fleſh of Vipers with their own fat, as one would do with butter, or with the fat of other animals. The Skin it ſelf, if men would, might be boyled and eaten with benefit; but that it would not be ſo ſavory, as the principal parts we have been ſpeaking of.

As for the *Chymical* preparations, all the parts of Vipers may be therein employed, and I would not except from them the Stomach it ſelf, nor the Inteſtins, if they were well clear'd of Worms, and all Excrements.

I alſo know no difference, as to goodneſs, of one Sex from the other, although moſt Authors have preſcribed the uſe of Females: On the contrary, if there be any

any ſuch difference, I would preferre the Males to the Females, when theſe are full of Eggs, and big, foraſmuch as then they are too much waſted for the feeding and increaſing of their Eggs.

As to the Seaſons, in which they are to be taken and uſed, I almoſt equally conſider the *Spring* and *Autumne*; for the times wherein men need them, ought to carry it in the behalf of thoſe who have a mind to feed on them. But care muſt be had to chuſe ſuch Vipers, as are bigg, fat, vigorous, and active; and not to keep them very long after they have been taken, becauſe they grow leaner and leſſer every day, both out of Melancholy, and want of food, which after that time they uſe not to take. I alſo make no difference between thoſe Vipers of *France*, that are bred in one Province, and thoſe of another; for thoſe of *Poitou* and the neighbouring parts are as good as thoſe of *Dauphine* and about *Lyons*, and in other places. The place therefore is not to be conſidered but for the quantity, and for the conveniency of getting them, in regard that they are not wont to be found in maritime places, which are the onely, that

Authors

Authors have diſapproved for Vipers, upon the belief, that the fleſh of Vipers, taken in them, did cauſe thirſt, by reaſon of the ſaltiſh food, they met with there.

CHAP. II.

Of the Uſe of the parts of Vipers, in reſpect of their nouriſhing Vertue.

THere is ſcarce an Author, that hath written of Vipers, but affirms, that in ſeveral parts of the World, many perſons, and even whole Nations, have fed, and ſtill feed upon the fleſh of Vipers; in ſomuch that in great and coſtly Entertainments, they made exquiſite and very conſiderable diſhes of it. There are alſo, that have alledged for an example ſome Nations, which by the uſe of Viper-fleſh, have

have extraordinarily lengthn'd their life, even to 140. years. It is needleſs, to inſert here the teſtimonies of Antiquitie on this ſubject; the Curious may finde them in Books. We content ourſelves to affirm, that many perſons do ſtill uſe it at this time in divers Countries, whether it be from Cuſtom, or to ſatisfie their appetite, or by the Advice of knowing Phyſicians, and that upon occaſions they finde wonderful effects thereof. I alſo doubt not, but that the uſe of it would be more frequent among us, if the vertues of Vipers were well known, and if one could diſlodge out of the minde of people the horrour and natural antipathy, they have againſt this animal. For the taſte of Viper-fleſh is very like that of Eeles; whence it is, that in ſome Countries Vipers are called *Eeles of the Mountain*; and one finds ſomething in them even more ſavoury than in Eeles. I know perſons, who well knowing the moſt inward parts of Vipers, have out of merriment, and in company, made good meals of them, and found it very ſavory meat. But thoſe that have too much averſion from this kind of food, may find very convenient

wayes to benefit themſelves by the vertue of them, ſo as not to be diverted from it by any abhorrency of the animal: for they may feed Capons and Pullets with the fleſh of Vipers cut in ſmall pieces, which thoſe Creatures eat very greedily; and continuing for ſome time to feed them therewith, it will certainly communicate the vertue of the Vipers to the body of thoſe Animals; which may be eaten, as we eate other Capons or Pullets, the taſte of which will be very ſavoury, becauſe that of Viper fleſh is ſo.

Neither ought we to doubt, that the qualities of Vipers paſs into the bodies of thoſe animals, ſince there are innumerable others, the fleſh of which hath not onely the vertue, but even the taſte of the things, they are fed with. The fleſh of the Birds, that live on Juniper-berries, and of thoſe, that live onely upon Olives, hath not onely their qualities, but alſo their taſte and bitterneſs, and that ſo highly, that one can ſcare eat them. In the Countries, where Silk-worms are bred, it is obſerved, that in their ſeaſon, which is chiefly in the months of *May* and *June*, the Eggs of Hens, that eat thoſe Worms, have

have a taſte and ſmell of them, as well as their fleſh; inſomuch that nice perſons feed their Poultry a part, and hinder them from eating any Silk-worms. It may be taken notice of, to this purpoſe, that 'tis a cuſtome to give to Nurſes the medicines, which young Children cannot be made to take, to the end that their vertue may paſs from the body of the Nurſe to that of the Child; and it hath been often obſerv'd, that the Urine of the Babe hath had the ſent of the Druggs the Nurſe had taken.

But yet ſome might phanſy, that Animals cannot take the good from the good parts of the things eaten by them, but they muſt at the ſame time receive the impreſſions of the ill ones, that are there; and it might even be objected, that Lizzards, Scorpions, Cantharides, and the other Creatures, on which Vipers do feed, ſhould impreſs in their bodies the ill qualities, they have, as, among the reſt, the Canthard, its Cauſtique quality. But notwithſtanding all this, the Experience we have of the harmleſsneſs of Vipers-bodies, and alſo of their good qualities, furniſhes us with a contrary argument, ſuf-

ficient to deſtroy that phanſy; and it teaches us, that the ſtomach of Animals converteth into good all the ill qualities, to be met with in the bodies, it receiveth to digeſt; and that it uniteth and appropriateth the good ones to the very ſubſtance of the Animal that hath eaten them: Whence it comes to paſs, that it is as 'twere transformed, or at leaſt very much changed by thoſe good qualities; and is upon that account capable to communicate them to other animals, into whoſe ſtomach it enters to be there digeſted. We ſay beſides, that there are divers Examples of Bodies, that would be altogether poyſonous in the ſtomach of men, which yet ſerve for food to, and fatten, other animals, which afterwards yield good nouriſhment to men. Such are *Hellebore* and *Hemlock*, which nouriſh and fatten Quailes and Goates, which afterwards are uſefully employed for the nouriſhment of men; and this is it, what *Lucrece* hath very well obſerved in theſe Verſes;

Præterea nobis Veratrum *eſt acre venenum,*
At Capris adipes & Coturnicibus auget:
Quipp[illegible]

Quippe videre licet pingueſcere ſæpe Cicutâ
Barbigeras pecudes; homini quæ eſt acre Venenum.

But thoſe, that have no averſion from Vipers-fleſh, may take of them the Heart, the Liver, and the Trunck, and having waſhed them well, they may then accommodate them to their own taſte in the dreſſing. Where they are to take care, not to make the fleſh too hot by too much ſpice, eſpecially pepper; but yet they are allowed to put to it ſome aromatique herbs, as Garden- and Wild-Thyme, and the like; or a little Nutmeg, Cinamon, Cloves, to raiſe the taſte. They muſt alſo avoid the fault, committed by the Antients, whipping and vexing the Vipers, before they killed them; leaſt this irritation ſhould cauſe ſome ill impreſſion in their body, which by it ſelf hath no venom at all in it. Let them alſo not caſt away the broth, wherein the Vipers have been boyled, becauſe it retaines the greateſt vertue of them. Neither do I ſee, why one ſhould ſtint the quantity, or limit the time of the uſe of it; that depending from the degree

of the illneſs, and from the conſtitution of the perſons, that will make uſe thereof. And although we know Vipers to be a very Alterative Medicine, and that their chief uſe is onely for their Medicinal qualities; yet if taken as an Aliment, there is no danger at all to eat of their fleſh, or to drink of their broth, ſomewhat more or ſomewhat leſs. It is alſo to be moderately ſalted; and thoſe that have any of the Fixed Salt of Vipers, ſhall do well to employ it. You may alſo adde to it ſome of its Volatile Salt, if you will have the Fleſh of Vipers work more powerfully.

As to the *Vertues* of Viper-fleſh, according to the conſent of innumerable Authors, whoſe opinion is ſupported by reaſon and truth, confirmed by many Experiments; we can ſay, that they are very great, and that there is no Animal in Nature, that affords ſuch and ſo many: And we wonder not at all, that the Antients have ſo frequently employ'd Vipers in their *Hieroglyphicks*, and adorned their *Medals* with them; thereby to deſign very advantagious things for the publick, and for private men; forasmuch as this Animal is very capable to furniſh them. For the

the uſe of it preſerves the natural heat in a very good temper, it repaireth the ſame, and reſtoreth it when 'tis altered; it yields a very good food; helps digeſtion by its heat, which is not exceſſive; it retards old age and prolongeth life, by a property, which Vipers have, to maintain in good plight the whole habit of the Body. Whence it is, that many have believed, that both Staggs and Eagles, induced to it by a natural inſtinct, eat all the Vipers, they can meet with, and that 'tis upon that ſcore, that their life is extraordinary long.

There is alſo adſcribed to Vipers, and not without reaſon, a Renewing vertue, capable to make young again; which they tacitly ſhew, by caſting their skin twice a year, and renewing themſelves by the cover of a new skin. This, joyned to the ſubtile parts, of which the Viper is compoſed, and to its lively and daring aſpect, teſtifies it to be pertinent enough, that Authors have attributed to it the vertue of clearing and ſtrengthning the Eyes.

Vipers have alſo a very particular vertue of Cleanſing the whole Body, and particularly the Bloud, and of expelling

through the pores of its skin all the superfluities: Whence it may be inferred, that they are very proper to cure the *Itch*, *Tettar*, *Eryſipelas* or Saint *Anthonies* fire, *Meaſels*, *Small Pox*, and the *Leproſy* it ſelf, the uſe of them being long enough continued; though I cannot well believe what *Galen* ſaith, That the Wine, wherein one onely Viper is choaked, is able to cure ſo great an Evil, and which doth not ſo eaſily yield to remedies.

Vipers alſo may, by removing all the impurities and obſtructions of the Body and skin, cauſe beauty therein; and upon this account it is, that many Ladies in *Italy* uſe them for their ordinary food.

By the good nouriſhment, they yield by the purity they give to the blood and to all the parts, and by the liberty they give to the Spirits to do their functions therein, they are a great relief to perſons in a Conſumption, and to thoſe that are emaciated by long diſeaſes, and waſted by tedious Feavers. There are even Authors, who aſſure that the uſe of them is capable to cure the Venereal diſeaſe; for which we doubt not but they may ſerve much, if they do not altogether cure it.

Their

Their mundifying vertue, joyned to the Alexiterial, makes them also very proper to expell all sorts of poysons, and even the Plague it self and all contagious diseases. They are also very contrary to all putrefaction, which commonly is the matter and source of most maladies; whence it comes, that those who use them, are not subject to diseases, unless they live irregularly, which is able to destroy all the good, which the use of Vipers might afford.

We might here specify many other sicknesses, that might be cured by the use of Viper-flesh; but we think not fit to do so, since the general vertues, which we have noted, may suffice to make men apply the use to many particular Evils, that may need it. Yet we shall describe, in the Chapter ensuing, the uses and Vertues of the parts of Vipers, taken as a Medicine, without any great preparation.

CHAP.

CHAP. III.

Of the Vertues of ſeveral parts of the Viper, and of their Uſe in Phyſick.

THE Vertues, which the *Fleſh* of Vipers is able to communicate to thoſe, who eat them for nourifhment, are doubtleſs very conſiderable; but they are not the onely ones, that Vipers are endow'd with; and not to alledge ſuperfluous things, we ſhall confine our ſelves to the principal Vertues, of which we have experimented the greateſt part.

It is very certain, that the *Head* of a Viper, broyled and ſwallowed, healeth the biting of that animal. The Heart and the Liver may do the ſame. Reaſon and Experience have confirm'd it; and therefore in

in an urgent occaſion thoſe parts may be very uſefully employed. The application of the Blood of a Viper to the Biting, as alſo that of its Head bruiſed, are neither to be rejected, nor is that of the Entralls: but theſe applications alone are not capable to cure it; for, the ſubtlety and quicneſs of the Spirits carrying them with great ſpeed into the body, there muſt be uſed internal ſpecifick remedies to repulſe them; and you may alſo very pertinently repeat (at the mouth) the uſe of the head, heart, liver, and the other parts of a Viper, without fearing to take too much of them, becauſe thoſe parts can never do hurt, and they alwayes produce ſome good effect. They may alſo ſerve for all ſorts of venoms and poyſons, and againſt all ſorts of contagious and epidemical diſeaſes.

Divers Authors aſſure, that the *Head* of a Viper, hung about the neck, hath a very particular quality to cure the Squinancy and all the diſtempers of the Throat; and that the Brain of a Viper, wrapt up in a little skin, and likewiſe hung about the neck, is very good to make the Teeth of children come forth; which effect

others

others believe to be due to the great teeth of Vipers. If we had experimented it, we could then ſpeak with more certainty. The remedies are eaſily practicable, and withal harmleſs; wherefore thoſe who need them may make tryal of them.

Some alſo have affirmed, that the *Liver* of a Viper, ſwallowed, keeps one from being bitten either by this Animal, or by any other ſerpent, and that the powder of Vipers hath the ſame efficacy. But we muſt not rely upon their report; we onely believe, that the Liver ſwallowed is capable to heal the biting of a Viper; like the heart, fleſh, and other parts, of which we have ſpoken; and that it may much facilitate the delivery of Women with child, as doth the Liver of Eeles.

The *Skin* of a Viper is not altogether deſtitute of vertue; for beſides that it is alſo, as they ſay, very good for the delivery of women, making a garter of it about the right leg, it hath a very ſingular vertue for all the diſtempers of humane skin: And although all the other parts, eaten, may work the ſame thing; yet, that we might have benefit from all, we have experimented, that the Viper-skin does perfectly

fectly heal the inveterate mangie of Dogs, making them eat it boyled or raw. It might alſo be ſaid, that the ſpecks in the Viper-skin ſeem to ſignify the marks of the itch or mangy, or, if you will, of the leproſy, which the ſcales of the skin repreſent yet better, and ſo tacitly expreſs its vertue.

Some have believed, that the *Gall* of a Viper applyed, can heal its biting; but we give no credit to it, no more than to the application of its bruiſed head. But this we judge, that it is proper for the wound of the biting, onely as it is for all other wounds, and for ulcers themſelves, having a great abſterſive, mundifying and cicatrizing vertue. It is alſo very good for the weakneſſes of Eyes, above all, for ſuffuſions and films, being taken inwardly, or applied outwardly; ſo far it is from doing them hurt.

The *Fat* of Vipers hath very great vertues; for, beſides that it is very good in the dreſſing of the Viper-fleſh (as hath been ſaid) it is able alſo, taking a drachm of it, to give great relief in Epidemical diſeaſes, and to expell the venom thereof. It is alſo very uſeful to facilitate the travel of women; and to diſſipate the ſwellings of the

the throat, anointing it outwardly therewith. It also much relieves Gouty persons, and serves to resolve nodosities. It unswels all hard and inveterate tumors, and even those that proceed from Venereal diseases; and for this reason 'tis, that *Jean de Vigo* hath used it in the Plaister which bears his name. It is likewise very good for Burnings, pustuls, and all distempers of the skin; and lastly, it is very powerful against all the illnesses of the Sinews, and of great vertue for the parts attackt by the Palsy. We might also adde many other vertues, adscribed by Authors to other parts of the Viper; but we forbear, because we have not experimented them.

CHAP.

CHAPT. IV.

Of the Powder and Trochiſques of Vipers.

SInce we do not alwayes meet with perſons, who, having need to make uſe of Viper-fleſh, are diſpoſed to eat thereof; it is very neceſſary to have ready ſuch remedies, that be as well accommodated to the inclination of the Patient, as fitted to remove the malady. The knowledge, which Phyſitians have had of the great Vertues of the Viper, joyned to the difficulty, met with in the point of pleaſing Patients, hath obliged them to ſearch for divers Preparations, in which the Antients did not well ſucceed; and if we would bind ourſelves to their way of preparing the *Powder* and the *Trochiſques*, we ſhould looſe the principal vertue of the Viper, and retain onely the moſt uſeleſs. For, in the opinion, which they entertained,

ned, that there remain'd alwayes ſome venom in the fleſh of the Viper, if it were not freed therefrom by ſome preparation or other; their practice was, to put the fleſh of Vipers in ſome earthen pot, and having luted it, to ſet it in a Bake-oven, after the Bread was drawn out, and to leave it there, till this fleſh was reduced to powder. In which preparation the beſt of this fleſh, which is the Volatile Salt, was certainly diſſipated. They alſo made ſeveral medicines with this powder, mixt among other medicaments divers wayes; of which we need not to enlarge. We ſhall content ourſelves, here to ſet down a preparation of the *Powder* of Vipers, which ſhall be grounded on Reaſon, and ſhall retain all the vertues of the Viper; eaſy alſo to prepare, and very convenient for the Patient to uſe.

Take then towards the end of *April*, or in the beginning of *May*, ſuch a quantity of Vipers as you pleaſe, Males and Females, chuſing big ones, and ſuch as are fat and vigorous, and uſing none of thoſe Females, which are already big with eggs; and then prepare thoſe, you ſhall have thus choſen, as follows: Without whipping and vexing

ing them, cut off, with a pair of ſizers, their heads and tailes, flea them, and empty them of all their entrals, of which you are to ſeparate the heart and the Liver; and lay aſide their fat for its peculiar uſes. Waſh the trunks of the bodies, the hearts and livers in clear water, and after that in white wine; then dry them with a very clean linnen cloth, and having put the hearts and livers again into their trunks, tye all the trunks with ſmall pack-thred, each at one end, and hang them up in the air in the ſhade, and leave them there, till they be well dryed; which will be in three or four dayes. After that, cut theſe trunks into ſmall pieces, and ſtamp them in a great Braſs-mortar with an iron-peſtle, and ſearce all through a very fine hair-ſive, and ſo keep it for uſe. This is the right Powder of Vipers, which contains all the vertues; to which may be added a drop of Cinamon-oyle, to give it a good ſcent.

There are ſome, who, to make this powder would have the trunks of Vipers cut in pieces, and put together with their hearts and livers in a Glaſs-cucurbit, and this covered with its head and luted, and

ſo placed with a recipient, in a very gentle *Balneum*; thereby, continuing that warmth for three dayes together, to draw the phlegm of Vipers, accompanied with a ſmall portion of the Volatile Salt, and to keep this liquor apart; and then to take out of the Cucurbite what ſhall remain there, and of it to make the powder of Vipers.

But, beſides *that* this method is troubleſome enough; *that* the fire of a *Balneum* is not ſufficiently ſtrong to ſend forth enough of the Volatile Salt, at a time when 'tis not yet looſen'd from its ſubject; *that* 'tis notwithſtanding too much ſo, not to emit inſenſibly ſome ſmal portion, which would afterwards be wanting in the Powder, and which alſo may exhale out of the water; beſides alſo *that* the Vipers are in danger to be too much dry'd in the Cucurbite, and even to be there roſted in part: We eſteem, there is cauſe to prefer *our* Preparation to *this*, in regard it is much eaſier, and, without any deſtruction or alteration of the good parts of Vipers, carries away all their ſuperfluous and uſeleſs humidity.

You might notwithſtanding follow this way

way in part, if you ſhould deſire to have good Viper-water; but then you muſt increaſe the fire of the *Balneum*, and finiſh the diſtillation in much leſs time, and yet take heed not to haſten the fire too much at the latter end, leaſt the water ſmell of the *Empyreuma* or burning. You muſt alſo, after you have taken out the parts of the Viper, that reſt in the Cucurbite, put them into a glaſs-retort well luted, and ſet this into a reverberating furnace, dapt and exactly lute to it a great Recipient, and give it a fire increaſed by degrees, and hotter about the end, to obtain the Volatile Spirit, Salt, and Oyle, that could not riſe by the fire of the *Balneum*; which are to be ſeparated and rectifyed, as we ſhall ſay hereafter. Then take a portion of this Volatile Salt well rectified, and diſſolve it in diſtilled water, and keep it carefully in a well ſtopp'd bottle, as an excellent remedy; of which you may increaſe or diminiſh the doſe, according to perſons and occaſions; and according as you ſhall have diſſolved more or leſs of the Volatile Salt in it.

Upon this occaſion, I thought fit to advertiſe thoſe, who diſtill Capons, Par-

tridges, ſlices of Veal, or other parts of Animals, in a Glaſs-limbec (as the cuſtom is,) and who employ for that purpoſe the fire of a *Balneum*, or that of Sand or Aſhes; that by a moderate fire they cannot make riſe almoſt any thing but uſeleſs flegm; and that, not being able to increaſe the fire without making the diſtilled water ſmell of the *Empyreuma*, they would ſucceed better, if in this they did, what I was juſt now ſaying of the water and volatile Salt of Vipers; and if they joyn'd their water with the volatile Salt of the diſtilled Animals, in which reſides the chief vertue. Thoſe, that have no mind to take ſo much pains, ſhall do better not to give diſtilled waters to their Patients, as the cuſtom is, ſince they have no vertue at all, if none be communicated to them by the volatil Salt of the Animal,

As to the *Trochiſques*, the Antients have as ill invented, and as ill ordered them, as the *Powder*. For, not to ſtay to blame here (as I have done elſewhere) the whipping, which they uſed, and which was not onely uſeleſs, but alſo very noxious; I ſhall ſay in a few words, that the decoction, they made of the body of the

Viper

Viper in Water, with Salt and Aniſe, till the fleſh would ſever from the bones, which they afterwards caſt away as well as the broth, was not a *Preparation* of the fleſh of the Viper, but rather a *deſtruction*, ſince it was made to leave its principal vertue in the broth; and that they weaken'd it yet more, by incorporating it with very dry bread, of which the proportion of a fifth to four times as much weight of fleſh, though but little in appearance, came yet to a moiety, ſince that four ounces of this fleſh, and one ounce of bread (which was ſo dry that it could not be leſſened) make onely two ounces of *Trochiſques*, when they are well dry'd. This we have more at large examined in our Treatiſe of the *Theriaque*; and becauſe their fault is very eaſily underſtood, I ſhall inſiſt on it no farther; nor on their reaſons for making uſe of Boyling to correct a malignity in the fleſh, (of which there is none,) and to be able to ſever it from the bones, which they believe naught, or at leaſt unuſefull, which yet are very good; foraſmuch as all their reaſons are ſufficiently refuted in the ſame Book, and becauſe they are yet more ſo, by what we have eſtabliſh'd in this.

And

And although it be not alwayes neceſſary to make *Trochiſques* of Vipers, ſince we might be without them; yet there being ſome uſe of them, and to preſerve their name, you may take a little Gumm Arabique, very white and pure, and reduce it to powder, and infuſe it in good Malvaſy, till it be well diſſolv'd, and the wine ſomewhat tinged thereof: then take of the powder of Viper, prepar'd as we have lately directed, and incorporate it with a ſufficient quantity of this gumm'd Malvaſy, braying them together in a Marble-mortar with a woodden-peſtle, and ſo reduce the whole into a ſomewhat ſolid paſte; whereof make Trochiſques, of the ſize and ſhape you pleaſe, and dry them in the ſhade upon a hair-ſive.

I ſaid, that we might be *without* Trochiſques, becauſe that having the Powder, which they are made of, that may ſuffice for our uſes; but there is one inconveniency in the Powder, in that it will ſcarce keep any conſiderable time, eſpeally if it be not well ſtopt up, and if, beſides, ſome art be not uſed to hinder the breeding of worms in it: Whereas Trochiſques, being made compleat by the addition

dition of Malvaſy, and by the cloſe compreſſion of the parts of the Powder, they are not ſo eaſily penetrated by the Air, nor ſo ſubject to corruption. The Trochiſques being dry, they may be ſlightly rubbed over with a little Balſom of *Peru*, which will give them a good ſcent, and help to preſerve them.

The Uſe both of the Powder and Trochiſques is excellent and alike; but the Trochiſques are to be reduced into powder, when they are to be uſed. Neither of them have an ill taſte, and they contain all the vertues, we have aſcribed to the Fleſh of Vipers, as having loſt nothing in drying, made without the heat of the Sunbeams, but a ſuperfluous moiſture, which could ſerve for nothing but corrupt them, if it had remained. They may be given in cordial waters, broths, wine, or ſome fit decoction, or you may make *Bolus*'s of them with Syrrups, Conſerves, or Cordial Confections, or turn them into tablets with ſugar.

Their main effect is, to purify, open, penetrate, and to drive to the extremities of bodies all venom, corruptions, impurities, ſuperfluities, and they may be very bene-

ficially uſed in many occaſions for divers maladies, without the fear of any ill ſucceſs. For both have this quality, that they do alwayes ſome good, but never any harm. Their doſe is from a Scruple to a drachm or two; and they may be given to all ages, and ſexes, and at all times.

CHAPT. V.

Of the Salt of Vipers made by the Ancients.

AMong many different Preparations of the Salt of Vipers, made by the Ancients, of which we finde the deſcriptions in their Books, there is none more famous, nor that hath been longer in uſe, than one that is very ample and much enriched by many Alexiterial remedies; whence tis alſo, that they gave to this Salt the name of *Theriacal*. But having conſidered this pompous Preparation,

on, we do not wonder, that a much esteemed Author hath not given it his approbation, since we cannot finde any thing in it, that is according to rule or reason, no more than there is in the rest. We finde, that the sentiments of that Author proceed from an understanding so judicious, and so knowing, that we cannot but subscribe to them, almost in all: For, in the Calcination, they used, there remain'd nothing but the *fix't* Salt, which contains but very little vertue; Vipers, as all sorts of Animals, having but little of Fixt Salt, whereas they have much of the Volatile, which soon riseth in the Calcination, and carries away with it the principal and the most essential vertue of the Animal. They were also much mistaken, when they thought, that *four* Vipers, which they burn'd with *fourty* pounds of Sea-salt, or *Sal Gemmæ*, or *Sal Ammoniac*, (as some would have it) and with a great quantity of Simples, should communicate great vertues to these Salts and these Coales. For in the Calcination, which they used to make in an earthen pot luted, with its cover on, and yet in one place pierced, the Volatil Salt of the four

four Vipers would certainly fly quickly away; and if it had ſtay'd (which yet we do not grant) and there had been half an ounce of it (which is a quantity beyond what the four greateſt Vipers could yield,) what, I pray, would that be to 40. pounds of Sea-ſalt, and to many pounds of Coales, more than a ſmall rivolet mingled with the Ocean? But as to the fixt Salt, four Vipers are not able to afford half a Scruple of it.

'Tis alſo certain, that both the Sea-ſalt and *Sal gemme*, do not periſh in the Calcination, but ſtill remain there. But if ordinary Salt Ammoniac be employed, the Urinous and Volatile part, which is in that Salt, will not fail to make its eſcape, as well as the Volatile Salt of Vipers, and there will onely remain the fixt Saline part of the Salt Ammoniac, mix't with ſome terreſtrial parts; which is that, we finde in the Diſtillation, after we have driven out all the Volatile Salt, of which afterwards, changing the veſſel and the fire, we draw an acid ſpirit, very much approaching to that, we draw out of Sea-Salt, by wayes almoſt like theſe.

Artiſts know alſo, that Herbs, Wood, Horns,

Horns, Bones, and other ſuch like matters, if they ſhould be calcined in an earthen pot, luted and covered, though a hole were left in the cover, would alwayes be afterwards found in the form of very black coales, although they had endured a great fire; and that the Salt cannot be ſeparated from them, unleſs they be calcin'd again in an open veſſel; or they being reduced to aſhes, the Salt be then ſever'd from them by a Lixivium, and by Filtration.

On which occaſion we relate an Example of an imperfect Calcination, which is naturally made in the Earth about the Summer-Solſtice, of the end of the root of many Plants, and among others, of *Mugwort* and *Plantain*; on which end, the ſubterraneous Fire, or, if you will, the Fire of the Sun, working, and yet being ſurrounded by the Earth, (which is to the root what the earthen pot, luted, is to the Vipers, and to the Mixts, that were ſhut up with them) burns it and reduces it to coales, but cannot turn it to aſhes. I have often found this to be true, and lighted upon a little coal at the end of the root of thoſe Plants, at the time above-mentioned.

So that, although the Fixt Salt of the added

ded be Simples in the Coales, yet it would have been more proper, and more methodical, to have quite calcined thoſe coales to reduce them to aſhes, and ſo to draw from them and to purify the Salt for uſe, than to make people ſwallow the groſs, earthy, and uſeleſs part of theſe coales.

Thoſe Antients added to this pretended Salt calcin'd, the powder of many Alexiterial Druggs, which not being deveſted of their vertue by any calcination, may communicate, and even alone furniſh the greateſt part of the good qualities, by them aſcribed to this Salt. And 'tis upon the account of theſe principally, that the name of *Theriacal* may belong to it, which impertinently would be attributed to the Vipers, ſince they have loſt their prime vertue in the Calcination.

This Preparation of *Theriacal* Salt doth ſufficiently ſhew us, that the Antients did not take pains to know the inward parts, of which mix't bodies are compounded, and that they did not well know the nature of the poyſon of Vipers, of which they imagin'd they ſhould be infected by the fumes proceeding from their Calcination; although none could come from them,

them, when there was none, as we have made appear. And although the ſmell, as well of the Vipers, as of the Simples, were troubleſome, whilſt they burned, yet they were not therefore at all venomous.

The little knowledge, which the Antients had, and many Moderns ſtill have, of the nature of the two Salts in Vipers, hath led them into a great fault, viz. to calcine the bones of Vipers, to draw from thence, as they thought, the true Salt of Vipers, which they were not at all like to finde, after they had diſſipated it by Calcination. The firſt fault hath drawn after it a ſecond; for the ſmall quantity of *fix't* Salt, they found in them, not much ſatisfying them, carried thoſe, that had no great ſenſe of honour or conſcience, to a very great abuſe, which was, to mix among thoſe calcin'd bones a great quantity of Sea-ſalt, to diſſolve this Salt, and and to boyle all together in water, to filter and coagulate it, and to ſell at a great rate this Counterfeit ſalt for true Salt of Vipers.

But, to accommodate ourſelves to thoſe, who, intending better, will make

no

no ill uſe of it; and to furniſh them with a pleaſing Salt for thoſe, that may deſire it for ordinary uſe; we ſhall here deliver the way of preparing a Salt of Viper, that ſhall have much vertue; the method of which ſhall be very eaſy, and the uſe very convenient.

Take three dozen of great Vipers, well choſen; cut off their heads and tails, flea them, and empty the bodies of all their entrals, and waſh them well, together with the Heart and Liver: Boyl all together in ten pints of common water, ſo long till all be perfectly boyled. Then ſtrain it, and ſqueeſe well all the parts; and in this decoction diſſolve four pounds of Sea-ſalt; and carefully filter it; afterwards, coagulate, or, if you will, chryſtallize this Salt, which will be found white and abounding with the vertue of the Vipers, and of no ill taſte at all; which you may uſe in all things as common Salt.

And to ſhew, that theſe boyled and ſqueeſed parts have left much of their vertue in the Decoction, and yet that they have not left all, and that ſtill there remains ſome of it, principally in the Bones; lay them abroad, and dry them, and then

diſtil

diſtill them, and you will draw from them, eſpecially from the Bones, a Volatile Salt and oyl, but in much leſs quantity, then if they had not been boyld.

If you would have a Viper-Salt of more vertue, and that might even be call'd *Theriacal*, you muſt proceed after the ſame manner, as hath been lately ſet down; but in ſtead of Seal-Salt, take a like quantity of Salt, drawn from *Alexiterial* and *Theriacal* Plants, as the roots of *Valerian*, *Imperatoria*, *Angelica*, *Leaves* of *Scordium*, the little *Centaurium*, *Carduus Benedictus*, and the like. 'Tis true, that this Salt is a little more diſpleaſing to the taſte than the former, but it may produce more conſiderable effects, and be uſed in extraordinary occaſions.

Theſe ſorts of Salt have indeed good vertue, and are convenient for laſting, eſpecially the two firſt: But the Volatile Salt hath ſomething more particular, and conſiderably better: the properties of it are innumerable, and it is an *Epitome* of the excellent qualities, contained in Vipers. We ſhall now ſpeak of its Preparation, as alſo of the Phlegm, of what is called volatile Spirit and Oyle, which accompany it;

it; and of the *Fixt* Salt, which remains after distillation, mixed among the terrestrial parts; and that done, we shall treat of their vertues and usefulness.

CHAP. VI.

Of the Volatile Salt of Vipers, and the Fixt Salt, and other parts, which are separated by Distillation.

WE make here publick our Preparation of the *Volatile* Salt of Vipers, with the more frankness and chearfulness, because we esteem it one of the best Medicines in Physick. 'Tis true indeed, that some Authors have already spoken of it; but there is none, that hath described it with more exactness, than we

we, nor that hath more desired, that every one might, according to this Method, obtain for himself and his occasions a remedy, which goes beyond many others, to say no more. We hope, that our way of proceeding will be well received by all, and that, if there be any that shall finde fault with it, they will be such only, who are unwilling to communicate what they have, and often wrap it up under the name of *Secrets*.

Take onely the Bodies, Hearts and Livers of Vipers, or, (to have the more benefit of all) add to them the Heads, Tails, and skins, and generally all the parts of a Viper; of which you will have a care to take away all the Excrements and Worms, as also the Eggs, that may be in the *Matrix* of the Females. Small and great, Males and Females are of the same goodness, as also the Salt is, that shall have been drawn from all the parts of the Body. Dry in the shade all these parts separately, then cut them into bits, and fill with them your Glass-limbec up to the neck, which is to be well luted. Put it in the midst of a Reverberating furnace, proportion'd to its bigness, cover it with its

head, and ſhut the Regiſter of it; Fit to the Limbec a Glaſs-recipient, which muſt be very large; and lute well all the joynts. Then begin to give a ſmall fire, which continue for about two hours, ſo that the Limbec be heated gradually, and the Phlegme begin to diſtil into the Recipient. Afterwards increaſe the fire gently unto a ſecond degree; and give a little opening at the Regiſter, and continue the ſame fire likewiſe two hours; then increaſe it, opening the Regiſter yet more, and ſo continue two other hours; at the end of which you are to give it the fire of the laſt degree, quite opening the Regiſter, and you muſt continue to drive the fire, till no more come out of the Limbec, and the Recipient be all obſcured by the Volatile Salt, which will ſtick to its ſides, towards the bottom, and to the upper part. Then let the veſſells cool, and the Furnace alſo; after which you are to un-lute the Recipient, wherein you will finde the Phlegme, that part which is called Spirit, the Volatile Salt, and the Oyle mingled together; except a part of the Volatile Salt, that may yet adhere to the upper part, and to the ſides of the Recipient, which you may dexterouſly

terouſly take away, and, if you will, keep for uſe, as 'tis. This Volatile Salt, Spirit, and Oyle, are ſo penetrating, that you are not able to hold your noſe over it.

Powre out, what you find in the Recipient, into a Gloſs-Body, which muſt be large, tall, broad below, and whoſe figure goes up ſtraightning towards the orifice; to which you muſt adapt a Glaſs-head, that is to have ſomewhat a high body, and large, and a very ſtraight mouth, and proportioned to that of the Glaſs-body. Lute the joynts exactly with paper and ſtarch; put the Body in a Sand-bath, and ſink it down as low as the matter reacheth; fit a ſmall Recipient to the beak of the Head, and lute that alſo: kindle under it a very gentle fire, and order it ſo, that the Sand and the Glaſs-body may be heated gently; after which you may increaſe it a little, but onely ſo as to make it ſtrong enough to drive up the Volatile Salt; which, being diſ-engag'd from the parts of the Vipers bodies, riſeth eaſily. It will be ſublimed, and ſtick every where to the inſide of the Head, like a Chryſtallized Snow. There will ariſe at the ſame time a little of the Spirit, which is properly nothing

but a portion of the Volatile Salt, having carried up with it a little of the Phlegme, that will run into the little Recipient, and of which even a part will congeal into Chryſtals. You muſt alwayes be careful in managing the Fire; for how little ſoever you increaſe it, the Phlegme will riſe with ſome of the Oyle, and they will diſſolve and hide the Salt; and then you muſt recommence the Rectification; but governing the fire well, when you ſhall ſee the Head well lined with Salt, which will be very white and very Chryſtalline, you muſt then un-lute it, and take it off, and lute on an other head, inſtead of the former. You are to take out the Salt, as ſoon and as well as you can; and to encloſe it in a ſtrong bottle, with ſuch a mouth, that the Salt may paſs through it, and which may be exactly cloſed, without which the Salt will eaſily fly away. Mean time, you are to continue a like fire under the Glaſs-body, and when no more of that Volatile riſeth, you are to deſiſt, and to take out of the head the Salt there gathered, and keep it as the former. Your Sand being cold, take off the Glaſs-body, and decant from it the remainder through a great Glaſs-

Glaſs-funnel, covered with paper for filtration, held over ſome veſſell. All the Phlegm will paſs thorough the Paper; but you'l finde ſome Oyle there, that cannot paſs, which you may make run through the Funnel into a bottle, having pierced the paper with ſome convenient inſtrument.

Thoſe that ſhall deſire a high and much more perfect Rectification of this Volatile Salt, may make it in manner following. Take two pounds of Ivory calcin'd to whiteneſs, and reduced to a fine powder; which is to be mixt with four ounces of this Salt. Then put all into a new Glaſs-Body, of the ſame ſhape with the former. To this let there be adapted and luted a blind Head, or ſuch an one, the extremity of whoſe beak is well ſtopp'd (for *that* is uſeleſs for this purpoſe, there being no phlegme; and if there were, the calcin'd Ivory being a dry Body, and in part ſpungy, would lick and retain it, as it would alſo the Oily part, that might happen to be among the Volatile Salt:) let there be given to this Glaſs-body a moderate Fire, with the ſame cautions as before; the Salt will quickly riſe, and ſtick to the Head;

where, the Sublimation being ended, you will finde it in the form of Chryſtals, white like ſnow; which you are to put up and keep in a bottle exactly cloſed, to uſe it upon occaſion. This Salt thus rectified ſmells not of Fire, and hath nothing but its own natural ſtrong and penetrating ſcent.

There may perhaps be found Artiſts, who will take it ill, that we have been ſo large and ſo particular in exactly ſetting down all the things, that are to be obſerved in preparing and rectifying this Salt. But it is not for them, that we have done it, but for thoſe, who not knowing it will be glad to learn it. We have given them ſincerely the true means uſed by ourſelves; which they may alſo practiſe in preparing and rectifying the Salts of the parts of all Animals. Thoſe that have any tincture of Chymiſtry, will here find enough to teach themſelves; as we have done, and do daily. Mean time they muſt not be offended, that there remain with us upon this ſubject ſuch things, which could not be ſaid, nor well comprehended but by thoſe that have labour'd a great while in this Art. Intelligent perſons, that

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ſhall examine our proceeding, or have a mind to experience the ſame, will find our ingenuouſneſs, by finding the ſucceſs of all we have made them expect, together with the facility, we give, of the Operation. They will alſo find, that our way of filling the Retort as far as the neck, is more proper than that of leaving a third part empty, as ſome would have it, in the Diſtillation of the Bones, Horns, and other dry parts of Animals; although thoſe, that underſtand it, practice it not but in matters that will melt, and may break the Retort, or let ſomething run out by the beak, when 'tis fill'd too high. But in dry ſubſtances, as are our Vipers, and the Horns, and Bones of Animals, Crabs-eyes, Stones, and the like, it is enough to leave this neck empty, to give vent to the parts raiſed from the matter, and that are to go into the Recipient. They will alſo acknowledge, that our way to leave the Oyl among the other ſubſtances, when we will ſever them by ſubliming and rectifying them, is not without reaſon, in regard that the Oyl hath commonly with it much Volatile Salt, which leaves it, and afterward riſeth in the Rectification.

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We eſteem alſo, that this Preparation will be preferr'd before many others, that are operoſe and have little method in them; and, among others, before the Rectification, which ſome pretend to make by the addition of Spirit of Salt to the Phlegme, and to that which is call'd Spirit, and to the Volatil Salt: which inſtead of rectifying this Salt, and of making it purer and better, changes its nature; and inſtead of ſubliming it to the Head and the top of the Body (as they have pretended it did, after the Phlegm was riſen,) the Spirit of Salt riſeth it ſelf in its firſt form, in its ſmell, colour and taſte, leaving at the bottom the Salt, which is there found like fixed, having the taſt and the other qualities of the Spirit of Salt, but being leſſen'd of two thirds of its weight. That kind of men have fill'd Books with many Preparations they underſtand not, nor have experimented: For, forgetting, among other things, in the proceſs of this, ſuch methods as are abſolutely neceſſary, and without which they do nothing, they promiſe impoſſible ſucceſſes, and putting the Cart before the Horſes, they fix the Salt when they pretend to ſublime it, and

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ſo very unadviſedly proſtitute themſelves to ſhame and confuſion. For, inſtead of rectifying firſt the Volatile Salt (as more intelligent men might have taught them, of whom they had borrowed this Preparation) and of ſubliming it, and of ſeparating it by this means from other parts; they labouring to diſguiſe the Proceſs, have retrenched the main and moſt neceſſary part of it, and employed at the very firſt that method, which they ſhould have obſerv'd to fix it, believing that that would ſublime it; not conſidering, that having by that means inverted nature, the ſucceſs would prove anſwerable to it. I ſet a ſide their unwarrantable practice of adding a pound of luke-warm water among the ſubſtances found in the Recipient, after the firſt diſtillation, ſince it is an Augmentation, not onely uſeleſs, but troubleſome, of that Phlegme, which muſt needs be ſeparated.

Now, although one part of this Salt, remaining in the Body of the Limbec, may yet afterwards becom Volatil, by mixing it with ſome Lixiviat Salt, and making it to ſublime; yet *that* is not done but with a new and very great loſs of its weight; nor

nor is the taſte of it better than of that, which ſhall have been well rectified according to the method, we have before deſcribed; ſince the Lixiviat Salts, by reviving it in part, give it as diſpleaſing a ſmel as the former. We may further add here, that the uſe of tall and ſtrait-neck't Bodies is much more proper for this Rectification, than the uſe of Matraſſes with long necks, myſelf having experimented, that the Phlegme fals back again more eaſily, and that the Volatil Salt riſeth purer in the Bodies of our faſhion; of which the *Figure* may be ſeen on the *Title page*, where alſo is that of the Retort and the Recipient, for the firſt Diſtillation.

Now although the ſame men, that have given us cauſe to reprehend them, have affirmed contrary to truth, that there is no *fix't* Salt in the parts of Animals: To prove that there is, and to benefit by that of the Viper; Take what ſhall remain in the Retort, commonly called the *Caput Mortuum*, which you will find of the form and colour of Coales; calcine it in a Furnace, or, to ſave expences, in a Potters Oven, till all become white and of the form of Chalk, pulverize it well

well, and make it boyl in a competent quantity of water, that may receive and diſſolve the Salt; filter it, and make it euaporate and conſume. You'l find at the bottom a coagulated Salt; though in a ſmall quantity, and ſuch an one, as that of five pounds of Viper-bones well calcin'd, we have obtain'd no more than three ounces of fix't Salt. This Salt hath a very ſharp and poynant taſte; it is Lixiviat, and approaching enough in divers regards to the fixt Salt of Tartar. You'l find on the Filter the Terreſtrial part, ſtripp'd of all its vertue; which then may juſtly be call'd *Caput Mortuum*. And thus you'l have the Phlegme, that which is call'd Spirit, the Volatil Salt, the Oyl, the Fixt Salt, and the Earth; into which all the parts of the Viper have been reduced in their ſeparation.

CHAP. VII.

CHAP. VII.

Of the Fixatiom of the Volatil Salt of Vipers.

ALthough the Volatile Salt of Vipers have in it, to ſpeak truth, nothing offenſive, but its ſtrong and piercing Smell, and that thoſe, who ſhall take into their mouth the weight of a good number of grains, cannot receive from it any other trouble but that of this Sent, which yet ſoon paſſeth away, this Salt leaving afterwards a ſaline and very agreeable taſte; yet notwithſtanding many perſons, offended with the piercing odour, which is firſt perceived in this Salt, and beſides diſſatisfied with its eaſy Avolation, unleſs it be extreamely well cloſed, have endeavoured to fix it, and ſo to free it from this ſmel, not conſidering that this ſmel cannot be altogether ſeparated from this Salt, but its vertue muſt be ſo too, and that the fixation changes its nature: And inſtead of contenting

ting themſelves to rectify it well, thereby to carry away, as much as may be, the adventitious ſmel, which it may have acquired by the violence of the fire by the firſt diſtillation, they have ſometimes altogether deſtroyed it, and have dealt with it, as if one would deprive *Muſc* and *Amber-gris* of their good ſent, and *Coloquintida* of its bitterneſs; and many compounds of their operations, which would not be what they are, if you ſhould robb them of the leaſt of thoſe parts that compoſe them.

We ſay therefore, that after the Rectification of this Volatil Salt, (ſuch an one as we ſhall ſet down beneath,) the beſt and ſureſt preparation would be, to do nothing elſe to it, but to make it to be uſed in that condition, only mixing with it things accomodated to the Patients taſte, or with ſuch other remedies, as do not change its nature, nor make it looſe any thing of its force or vertue.

If the Fixed Salt of Vipers were capable to arreſt and retain the Volatil, there were then nothing to be ſaid againſt this fixation, becauſe having been both formed jointly and in the ſame body, they have

have no averſion to, but rather are able to help one another; But this common origin, and this friendſhip which they have contracted, whilſt they lived together in one and the ſame ſubject, hinders them from deſtroying one another, and maketh, that what is Fixe can nor will change the nature of the Volatil. And indeed, although you mixe them together, and that the quantity of the Fixe be five or ſix times greater than that of the Volatil, and that they may alſo lodg with one another; yet they both equally keep their nature and vertue, and they may be ſeparated by fire, and manifeſt at all times their ſeveral and diſtinct vertues. But this hinders not the taking one Salt among the other, nor that the Fixe ſhou'd not then borrow ſomewhat of the ſubtilty of the Volatil, the better to penetrate the Entrals and Veſſels; to open the more vigorouſly the obſtructions, and to expel the impurities, it meets with, by ſiege or urine; and that, on the contrary, the Volatil Salt, helped by the Fix't Salt, ſhould not carry away and drive out through the pores of the skin or other ways, the more groſs and more viſcous parts of the humors, that perhaps might

have

have eſcaped its quick and ſubtile operation: For which uſes, both Salts may be mix'd together upon occaſion, without undertaking an impoſſible fixation.

But eſpecially, the fixing of this Volatil Salt by *Quick-lime* cannot paſs with all Artiſts but for an operation altogether deſtructive to it; and 'tis that, which is moſt of all to be avoided, becauſe not only it carries away the ſmel, taſte, and vertues of this Salt, but quite changeth its nature, and converts it into its own, by petrifying the ſame.

The Fixation of this Volatil Salt, by the Spirit of Salt, although it ſeem to deſtroy it and change its nature, in that it carries away the ſmel and taſte of the Volatil Salt, may notwitſtanding be admitted rather than the other, in regard that the Spirit of Salt, by preſerving the vertue it hath to open all the obſtructions of the inward parts, working upon the Volatil Salt, may appropriate to it ſelf ſomething of its vertue, eſpecially that which is able to ſecond its action, and to expel together with it, by urine or other ways, the moſt tenacious and moſt ſtubborn humors. Thoſe that would expel the humors

mors by theſe ways, may uſefully prepare it after this manner.

Mix four ounces of the Volatil Salt of Vipers, well rectifyed, with four ounces of Water; put them into a Glaſs-Cucurbite Somewhat high, of a narrow mouth, broad and flat towards the bottom, holding about two pints. Fit to its mouth a Glaſs-funnel, the end of whoſe pipe is very narrow: Lute the funnel quite round about the orifice of the Cucurbite, ſo that there may be no other aperture but that of the end of the funnel. Then powre, little by little, and drop-wiſe, ſome Spirit of Salt well rectified upon the Volatil Salt. At firſt there will be a conflict betwixt them, which will cauſe an ebullition, but that of a ſhort duration. Continue to powre upon it of the ſame Spirit of Salt, gently and leiſurely, according as you find the ebullition ceaſe, and by intervals ſtir alſo the Cucurbite; and repeat this ſo often, that at laſt there appear no motion any more, and the Spirit of Salt have as 'twere mortified and fixed the Volatil Salt. Then place the Cucurbite in ſome receptacle furniſh't with Sand; fit to it a head, lute it (though at the

the beginning that be not neceſſary) and by a ſlow fire draw away all the moiſture of the Spirit of Salt, and of the Volatil Salt, which will riſe almoſt inſipid. Continue the fire ſtill, and when you ſhall perceive a taſte of the Spirit of Salt in what ſhall be diſtill'd, change the Recipient, increaſe a little the fire, and drive it (yet without too much violence,) until there diſtil no more, and that the Salt remain at the bottom of the Cucurbite altogether dry and of a gray colour. You'l find in the Recipient a Spirit of Salt of the ſame taſte, of the ſame colour, and of the ſame force it had when it was powr'd upon the Volatil Salt; but you ſhall not find any part of the Volatil Salt riſen to the head, nor to the top of the Cucurbit, as ſome have given out it doth, without having experimented it, as we have done. The gray Salt, found at the bottom, is but in a ſmal quantity, being leſſen'd almoſt of two thirds: It's taſte is very ſharp, biting, and much differing from what it had before it was fix'd, and as 'twere mortified by the Spirit of Salt. After this you may diſſolve this Salt in water, filter it, and make it evaporate, and letting it cool,

you'l find at the bottom a ſmal quantity of Salt coagulated in the form of Chryſtals. Powr out by inclination the water ſwimming on the top, to have the Salt by itſelf, which you may dry in the Air, or the Sun, or over a little fire. You may alſo make good uſe of the Salt that ſhall have remained in the water that ſwam a top, by making it evaporate in part, Chryſtallizing and drying it, as the former. You might, if you pleaſed, very well omit luting the Funnel upon the Cucurbit, when you will powre the Spirit of Salt upon the Volatil Salt; foraſmuch as we have found by experiment, that in the operation of the Spirit of Salt upon the Volatil Salt, there riſeth nothing but phlegme, that hath neither vertue nor ſmel; although the ſame perſons, that have err'd in many things in the rectification of the Volatil Salt, have fear'd they ſhould looſe therein a Volatil Spirit, which was only in their imagination: And the luting, which we have adviſed, was only to prevent peoples belief, that a part of the Volatil Salt might have eſcaped that way.

But although this Volatil Salt appear fix't, and remain as ſuch at the bottom of the

the Cucurbit, after distillation, yet there is a part, which retakes its former nature, and becoms Volatil again, if it be mix'd with *Salt* of *Tartar*, or with some other Lixiviate *Salt*, putting them together in a subliming vessel. For these *Lixiviate Salts*, being of a nature contrary to *acid Salts* and *Spirits*, do mortify them and retain them to themselves, and let go the Volatil *Salts*, which the acid spirits had, as 'twere, mortified and fix'd, and all that was Volatil in this seemingly fix't *Salt*, riseth in a white form, and hath almost the same taste and the same other qualities of the Volatil *Salts* well rectified. Yet you will also find there a great diminution of its weight, so that it will be more advantagious to keep it in the condition, it was in before this last sublimation; the greatest advantage of which is, to come to know, that the fixation, that hath been made by the Spirit of Salt, although it have as 'twere changed the nature of the Volatil Salt, and hid its diaphoretique quality under that of the diuretique, yet hath not quite destroyed it, since there is some part, that can retake its pristine form and vertue.

This Salt thus fix'd poſſeſſeth the vertues of a Spirit of Salt concentred, but they are found augmented by thoſe, it hath borrowed from the Volatil Salt. Thoſe, who would only carry away, by urine or ſiege, the ſuperfluous humours of the body, may uſefully prepare and employ it; but thoſe, that ſhall uſe the Volatile Salt well rectified, without changing its nature, nor diverting its action by any fixation, will finde therein ſuch effects, as will be incomparably more apparent and more ſenſible, and will not waſte of it ſo much.

CHAP.

CHAPT. VIII.

Of the Vertues of the Volatile Salt of Vipers, and of what the other parts, ſeparated by Diſtilla on, may perform.

THE Volatile Salt of Vipers is to be conſider'd, as a Sun, as well among the parts, that riſe by diſtillation, as among thoſe that reſt in the Retort; there being none among thoſe that are come over, but have borrowed from it almoſt all the vertue it can have; nor any of thoſe that have ſtay'd, but have need of it, or are uſeleſs without it. The *Flegm* that riſeth firſt, carries alwayes ſome part with it, without which it would produce no effect. That which is called *Spirit*, is nothing elſe, to ſpeak aright, but a Volatile Salt, which in the diſtillation

hath been followed by a little Flegme diſſolving it, and giving it the form of a Spirit: which may be ſhewed by the Rectification, wherein that ſaline volatil part is ſeparated, raiſed, and coagulated into a white and chryſtalline forme, and leaveth at the botom of the cucurbite the moiſture that had changed its nature, and is nothing elſe but flegm. We ſay, on this occaſion, the ſame thing of what many Authors improperly call the Volatil Spirit of an humane skull, of Harts-horn, and of other parts of Animals, they being nothing elſe but Volatil Salts mixt with flegme, which they afterwards quit, when they are rectified. The *Oyle* alſo would have but very little vertue, if it borrowed no Volatil ſalt, and if it retained not in it a good part thereof, as may be obſerved in the Rectification: for, if the Oyle were meaſur'd, or weighed, before 'tis put among the reſt into the cucurbite for rectification, and if it were weighed again after that all the Volatil Salt is riſen, it would be found much diminiſhed in quantity, and in ſtrength alſo, becauſe moſt of the Volatil Salt, which had joyned it ſelf to it, hath been carried away by the rectification.

tion. So thoſe, that ſeparate the Oyle from the other parts to rectify them, and who uſe it not but for wounds or ulcers, and to take away ſuperfluities, do doubtleſs not know it aright; for it is alſo endow'd with other vertues more conſiderable; of which we ſhall ſpeake in this *Chapter*. The Fixt Salt, which reſts in the Retort, mix't among the terreſtrial part, although it is to be put in the rank of Lixiviat Salts, and poſſeſſeth few other qualities, but thoſe of Salt of *Tartar*, yet retains ſomething of the nature of the Volatile ſalt. And thoſe, that have conſidered this Salt as a *Cauſtick*, have had good ſucceſs with it, without knowing its nature, ſeing they imputed it to the maligne parts, which they believed to be in Vipers, whereas they ſhould have aſcribed it to the nature of Lixiviate ſalts. But this Salt being taken at the mouth, will be much more effectual, if you mingle ſome Volatil Salt with it; this Cauſtique faculty not hindring but that it may be taken ſafely and beneficially in appropriated liquors, as many other lixiviate Salts are.

The *Terreſtrial* part hath nothing in it, that deſerves to be conſidered, and it may

juſtly be called *Terra mortua*, Dead earth, after it is freed from its fixed Salt. So that all the parts, that riſe by diſtillation, as well as thoſe that cannot riſe, are of ſmall force, or altogether uſeleſs, without the Volatil Salt. It is therefore upon good reaſon, that we attribute to it the principal vertues, which a Viper can furniſh.

The ſimilitude of ſubſtance, which the Volatile Salt of Viper hath with the ſpirituous parts of our Body, conjoyn'd to its ſubtile and piercing quality, maketh, that accommodating itſelf to their condition, and finding all liberty in its actions, it produceth all the effects, it is capable of, and penetrateth without any oppoſition into the moſt ſecret and the moſt remote parts of the Body. It hath this peculiar, that though it act as a Soverain, and finde nothing of reſiſtance to its dominion, yet it exerciſeth it not as a Conquerour, nor as a Deſtroyer, but rather as a Reſtorer of the places and parts, where it paſſeth; and although all its courſes be extraordinary quick and precipitate, yet they are ſo well meaſured and ſo well directed, that no part of the Body miſſeth them, and that none of its ſteps is unuſeful, but rather very beneficial

neficial to all the places, where it paſſeth.

Now ſince the fleſh, the heart, the liver, and the other parts of the Viper, taken as an Aliment, or as a Medicine, may ſerve for the cure of many maladies, and produce very conſiderable effects; 'tis not at all to be doubted, but that this Salt, which is the moſt ſubtile and the moſt potent of them all, is ſomething more ſublime and more efficacious. And we are aſſur'd, that if it were well known to us, it would paſs for an almoſt Univerſal medicine; men would be careful of preparing it, and we ſhould ſee it often preſcribed by Phyſitians, and find it ſucceed in innumerable obſtinate diſeaſes, that are but ſeldom and difficultly cured.

To Judge well of the Effects, which this Volatile Salt can produce in our Bodies, we muſt know its manner of operation, which is, to open, to comminute, to attenuate, to pierce, and to drive to the extreme parts of the Body, and through the pores of the skin, all the impurities, and all the ſtrange bodies, that can get out by thoſe wayes. Further, it is an enemy to all corruption, very friendly and very agreable

able to our nature, which it assists and fortifies, enabling it to expell, not onely by the pores of the skin, but also by siege and urine, and by all the Emunctories of the Body, the superfluous humors, which molest it: Whence it comes to pass, that it produces admirable effects upon a thousand occasions, curing a great number of sicknesses, or at least giving great relief therein, even in those, that are most refractory, and most difficult to cure; such as are Apoplexies, Lethargies, Convulsions, Palsies, and many other maladies, believed to have their source in the Brain. It is also a great relief to the Distempers of the Breast, as Swoundings, Palpitations of the Heart, Difficulties of Breathing, and Pleurisies. Besides it particularly unstops the Obstructions of the Liver, Spleen, Mesentery, and other parts of the lower Belly. It dissipates all inward impostumes, in their rise, and dislodgeth secret and unknown pains, which have their origin in the Spirits. It helps digestion, the purification of the mass of the blood, and its distribution to all the parts of the Body, and resolves and prevents coagulations: And so being an Enemy to all corruption, it is very proper

for

for all ſorts of Fevers, cauſed thereby; as for moſt intermittent Feavers, and particularly *Quartans*. It alſo worketh powerfully in the diſtempers of the *Matrix*; and is a remedy to all the vices of the skin, and to the Leproſy it ſelf: but above all, 'tis ſpecifique againſt all Bitings and ſtingings of venomous creatures, againſt all venoms and poyſons, if they be not corroſive; for in that caſe, recourſe muſt preſently be had to Vomitives and to Unctuous things, after which it produceth good effects. It hath a particular vertue againſt the Plague, againſt all Contagious diſeaſes, and Epidemical ones, ſuch as are the Meaſels, Small Pox, and the like. In a word, the Inductions, we can draw from the great number of Experiments, we have ſeen of it, at different times, oblige us to affirm, that its vertues goes beyond what can be expreſſed. And thoſe, that ſhall make reflexion on what we have ſaid of it, will be able to apply and uſe it beneficially to many other ſickneſſes, which to enumerate would be too prolix and too tedious.

In the mean time, we cannot forbear to relate here a very remarkable Experiment, made upon a Gentleman, who ſuffered about

about a month ſince, a violent and continual paine, doubled and redoubled, at the right part of his front pretty near the Temple: the end of a finger might cover the place of the pain; there appeared no redneſs nor ſwelling, and there was perceived no hardneſs. Yet the pain, though it was, as 'twere, fixed in a point, was communicated to the other neighboring parts, ſo that the Gentleman could not chew, nor ſo much as open his mouth to take down a little broth, but with extreme pain, though hunger urged him. The Phyſitians, that ſaw him, had uſed ſeveral means to relieve him, and, among the reſt, *Venæ*-ſections in the arm and foot; they had purged him often; they had employed frictions of his neck and ſhoulders; they had applyed to him Veſicatories, and Snailes, behind his eares: they had cauſed his temporal artery to be open'd, and drawn from him ten or twelve ounces of arterial blood, and then cauteriſed the Aperture; they had alſo preſcribed him powerful Sudorifiques, which were continued many dayes morning and evening, and had made him ſweat very copiouſly; and the Patient himſelf, of his own accord, being extremely preſ-

ſed

ſed by the violence of the pains, cauſed one of his upper teeth, which was very ſound, to be pulled out, hoping thereby to give ſome vent to them: But after he had uſed all theſe means in vain, one doſe of the Volatil Salt of Vipers, given in wine, remov'd preſently all the pain, which cauſed as great a wonder in the Aſſiſtants, as ſatisfaction in the Patient. This ſo ſurpriſing effect, which demonſtrateth better, than all reaſons, the force and efficacy of this Volatil Salt, may alſo conclude the diſcourſe of its Vertues.

There remains now, that we ſay ſomething of the vertues of the *Oyle*, which riſeth by Diſtillation with the Volatil *S*alt, of which it alſo retains a part. Its ſtrong ſent is the cauſe, that it is not often employed; whence it comes, that ſometimes it is more advantageous to the Preparer, to profit by the rectification of the Volatil *S*alt, which it hath, than to keep it in its condition for Patients that ſhall uſe it notwithſtanding its ſtrong ſmel and ill taſte. This ſmel is ſo intimately ſticking to it, that there is no rectification, able to remove it. But we make herewith known to all thoſe, that ſhall be able to com-

comply with the uſe of it, that it is one of the beſt and moſt efficacious outward remedies in all Phyſick, provided it be made uſe of, when 'tis yet indued with its Volatil *S*alt: For it opens, attenuates, reſolves, is abſterſive, and admirably cleanſing; and we know, who have experimented it, that the continued anointing with it, accompanied with the internal uſe of the Volatil *S*alt, produceth admirable effects in the parts labouring under the Palſy, and deprived of motion, and even in thoſe, that are dryed for want of the communication of *S*pirits and nouriſhment. A little *S*punge imbibed with this Oyl, carried in a little box pierced, and often ſmelled to, is very good in the time of the Plague, to keep off the ill Air, and to fortify the Brain, and the noble parts. It is alſo good to make it to be ſmelled, to put of it in the noſtrils, and to annoint the Temples with it, in Epileptical *S*ymptoms, and for thoſe, that are troubled with giddineſs, and have their Brain charged with vapors or flegme; for it gives them vent, and diſpels them powerfully. It hath alſo a conſiderable effect againſt the ſuffocations of the *Matrix*,

trix, and againſt all ſorts of worms; in which caſe, ſome drops of it may even be given at the mouth, in wine, or broth; and the hollow of the ſtomach anointed therewith. It viſibly diſſipitateth all outward contuſions, and ſerveth much for inward ones, and eſpecially for thoſe of the Head. It reſolves tumours and hardneſſes, giving iſſue by the pores to ſuch matter, as can tranſpire, digeſting the groſſer, and bringing them to a laudable ſuppuration. It is alſo abſterſive and cleanſeth all ſorts of Ulcers, and healeth all the diſtempers of the skin, even the moſt ſtubborn, provided the internal cauſe thereof be removed. In all which evils its effects are yet more quick and powerful, if it be enforced by the internal uſe of the Volatil Salt, which, in a word, is that, which gives it its main vertue.

We ſhall add, on this occaſion, that the Ancients valued very much their Oyl of Vipers, which they prepared ſeveral ways, ſome by infuſion, ſome by the decoction of Vipers in Oyl of Oliues. If they had rightly proportioned the quantity of Vipers with that of the Oyl; if they had added thereto what moiſture was neceſſary; and

if

if in this they had employed ſome good method, this Oyl might produce good effects, and we ſhould approve of it, and refer our Readers to it. But finding nothing regular in all the Preparations, by them deſcribed, we thought good here to ſet down one, according to all the rules of Art.

Take about the end of *May*, or the beginning of *June*, a dozen great Vipers newly taken, cut each of them into ſeven or eight pieces, and put them into a well glazed and ſtrong earthen pot: powr upon them three pounds of Oyl of Olives, and one pint of white wine; cover the pot well, and make it boyl over a gentle fire to the conſumption of the moiſture. Then ſtrain all, ſqueeze out the Vipers well, and keep the Oyle for uſe. In the mean time, fear not (as the Antients did) the Vapors, that may iſſue out of the pot during the decoction; for the Vipers, as we have ſaid, have no poyſon in all their body. This Oyle, thus prepared, hath not, 'tis true, all the ſtrength and vertues of the diſtilled Oyle, of which we were ſpeaking a little before; but it may very well ſerve for an oyntment in all the diſtempers

ſtempers of the skin, in contractions of nerves, in rheumatiſmes, & in many other evils.

CHAP. IX.

Of the Manner of uſing the Volatil Salt.

ALthough it be impoſſible to ſpecify in particular all the wayes of Uſing the Volatil Salt of Vipers, no more than one can well enumerate the ſickneſſes, that may have need of it; Yet, in ſome degree to ſatisfy thoſe that may deſire it we ſhall make here an Abridgment of a good part of what we have ſeen practiſ'd by Pyhſitians, that perfectly know the qualities and proprieties of this Salt, and uſe it daily to the great benefit of their Patients.

You muſt *firſt* know, that its piercing Taſte hinders it from being given alone, and that it muſt be mix't, *now* with ſome

Aliment, as in broth, the yolk of an egg, a roſted apple, a little jelley, &c. *ſometimes* with Medicines, and that innumerable wayes, which partly depend from the humour and diſpoſition of the Patient, but chiefly from the wit, knowledge, and diſcretion of the Phyſitian. For this Salt calls for a Phyſitian, that hath ſufficient ability to know and meaſure its force and activity; that is intelligent and verſed in all Maladies, to be able beneficially to employ it in thoſe that require it, that knows to chuſe a favorable time and occaſion; and to mix it pertinently and to good purpoſe with ſuch things, as may not change its nature nor divert its operation, nor ſubvert the indication, he ſhall have taken. So that 'tis neceſſary, to be equally aſſur'd of the genuine and methodical preparation of the Salt; of the knowledge of its qualities and vertues; of the nature of the diſtemper, of the condition, temper, and ſtrength of the Patient; of the fitneſs of its exhibition among aliments or appropriated medicaments, and of the occaſions and the time, in which it may be uſefully employed. And when a due regard hath been had to all theſe circumſtances, men will

will not fail to finde very good effects of it. But that thoſe, who are not accuſtom'd to make uſe of it, may not unawares finde in it effects contrary to the nature of this Salt, we have thought ourſelves obliged to advertiſe them, that they muſt above all things avoid mixing them among *Acids*, and eſpecially among Spirit of Salt, Vitriol, Brimſtone, and the like, which would fix it and deſtroy its operation. To find therefore facility in its exhibition, it may be taken in diſtilled waters, or ptiſane, or ſuch decoctions as are appropriated to the diſeaſe; as alſo in Juleps, Emulſions, or Potions diverſly compoſed. It may alſo be mix't in Conſerves, Extracts, Confections, and the like; as alſo in Lozenges and Opiats, diverſly made according to the nature of the diſtemper, and the intention of the Phyſitian; It is alſo mingled with Purgatives, Sudorifiques, Aperitives and Diuretiques; and no leſs, with its own fix't Salt, and ſuch other Salts, as are not contrary to it. It is alſo given in Wine, and among certain Mineral waters. It may be adminiſtred to both ſexes, and to all ages, at all times and hours, between meals according to the nature of

the diſeaſe, and the intention of the Doctor. It may be taken, if one will, ſeveral times in a day, and even at night; and the uſe of it may be continued for a good while.

As to its doſe, that is different, according to the occaſion, age, temper and humour of the Patient, and the nature of the diſtemper, and the reiteration made of it: For, the doſe is to be much leſs for thoſe, who take it often in one day, and continue the uſe of it, than for thoſe, that take it but once in a caſe of need. Sometimes 'tis eſteemed ſufficient to give 6. 8. 10. or 12. grains of it; but on certain occaſions we may give 20. or 25. grains, and ſome-times, half a drachme, and even a whole drachme. But diſcretion and skill is to be uſed; without which, this Salt, as excellent as 'tis, may produce effects quite contrary to what the Phyſitian and the Patient might expect from it.

CHAP. X.

CHAPT. X.

Divers Remedies or Compoſitions, of which the Volatil Salt of Vipers is the Baſe or Ground.

WE had not undertaken to deſcribe the vertues, nor the Uſes of the Volatil Salt of Vipers, no more than of the Fix't Salt, and of the Oyle that riſeth by Diſtillation, if this our Book were only written for the skilful Phyſitian, who perfectly knows all, and eſpecially the parts that may be drawn from the Viper. But being deſirous to do a good office to ſuch perſons, as have no knowledg thereof, or that knowing it in part, have need to be directed, eſpecially in the exhibition of this Volatil Salt; we thought good to conclude this Book with the *Receipts* of

the chief Compoſitions of which this Volatil Salt may be the Ground, which are not found in Books, and may produce Effects worthy of this Salt.

And knowing, that there are many curious perſons, who having a great eſteem for the Viper and its uſes, make preparations thereof in private, following the *Receipts* they find in Books, which ſometimes are well, ſome-times ill preſcribed, or ill executed; We ſhall impart to them an *Elixir* of *Vipers*, that ſhall be of great vertue, pleaſant to the taſte, of eaſy preparation, and of long duration.

Take four douzen of Hearts and as many Livers of Vipers, dry'd in the ſhade, and reduced to powder; two drachmes of good Cinnamon, half a drachme of Cloves, groſly beaten: put them into a ſtrong glaſs-bottle, holding about two pints. Powr on it a pound of the *Queen* of *Hungary's* Water, a pound of Meliſſe-water, half a pound of Orange-flower-water, and half a pound of Roſe-water. Cloſe the bottle exactly, and expoſe it to the Sun for fourty dayes; after which diſſolve in the liquor a pound of fine Sugar, and paſs all through a clean bagg. Put up this

this Elixir in a Bottle, and add to it half an ounce of the Volatil Salt of Vipers, well rectified, twelve grains of Levant-Musk, and as much of Amber-gris. Close the bottle exactly, and you may keep this *Elixir*, to use it in time of need, from half a spoonfull to a whole. You may take of it in the morning upon an empty Stomack, and at all hours, according as necessity shall require. This medicin is very good and very convenient: It is not onely proper against all Poysons, against the Plague, and all Contagious and Epidemical diseases, but it also fortifieth all the noble parts, preserves the Natural heat in good condition, and by this means the use of it conduces much to preserve Health, and to prolong Life.

The *Elixir* following deserveth also to be communicated to the Public, as a medicine that is not common, and is very available, not onely for the Sicknesses of men, as well in the Brain, as the stomack, and all the noble parts; but also very particularly, for most of the diseases of Women. I shall give you here the Description of it. Take an ounce of good Saffron, as much of fair Myrrhe, as much of *A-*

loes Socotrina, and the ſame quantity of White Amber; a drachm of the Extract of *Opium*, and as much of the Extract of *Caſtor*. Mingle your Extracts in a little Spirit of Wine; pulverize all the reſt; and put altogether in a Glaſs-Body: powr upon it three pounds of Spirit of wine tartarized; place the Body in a Bath of Aſhes; fit an Head to it, with its Recipient, well luted together: Give it a moderate fire, and draw from it about the moiety of the Spirit of Wine; then unlute your veſſels, decant the tincture, that will ſwim above your powders, which will be found very much imbued with all their qualities; and keep it by itſelf in a bottle well-cloſed. Powre the Spirit of Wine, which you have drawn off, upon the remainder in the Body; Fit again to it the Head and the Recipient, and draw again from it the half of the Spirit of Wine. Decant again the tincture ſwimming a top, mingle it with the firſt, and keep it likewiſe. Cohobate for the third time the Spirit of wine, drawn off, upon the remainder in the Body; proceed as before, and powre off the tincture ſwimming a top, and mingle it with the former: then filter all three toge-

together, and powre all into a ſtrong Viall, adding to the whole an ounce of the Volatil Salt of Vipers, which will eaſily diſſolve in it; keep the whole thus mix't and well cloſed. The *doſe* may be from ten to ſixteen drops.

We ſhall yet adde to this an *Opiate* of great efficacy for moſt diſtempers of the Brain; and tis this: Take half an ounce of the Extract of the root and ſeed of the male-Pæony; and of the true Miſſeltoe of the Oak, and of that of Betony-flowers, and of that of Clove-gilly-flowers, the ſame quantity of each of them; three drachms of the Confection of *Alkermes* of *Meſue*, three drachms of the Volatil Salt of Vipers, one drachme of the Volatil Salt of *Succinum*, two drachms and an half of prepared Pearl, and as much of Crabs-eyes prepar'd; three drops of Cinamon-oyle, and as much of the oyle of Mace: Mingle all according to Art, and make an Opiate of it, and keep it in a pot of Fayence (a ſort of fine white Earthen pots) well cloſed. The doſe of it may be from a ſcruple to a drachme.

You may alſo make, in the following manner, an opening and laxative Opiate, that

that ſhall conduce to the cure of ſundry long and ſtubborn diſeaſes, eſpecially of thoſe that are cauſed by ſeveral obſtructions of the parts. Take of the Conſerve of Tamarisk-flowers, of the Conſerve of the Flowers of *Geniſta* or Spaniſh-Broom, of that of Mary-gold, and of that of the Male-peach flowers, of each ſix drachms; half an ounce of the Volatil Salt of Vipers, as much of the Extract of the ordinary *Iris* root, and as much of the Extract of Rubarb; two drachms of the fix't Salt of Vipers, as much of the Mineral Bezoar, and as much of the Salt of Worm-wood; a drachme and an half of Roſin of Scammony, and as much of the Extract of Coloquintida; and a drachme of the powder of Cinnamon. Mix all theſe things together, and adding to it, as much as needs, of the Syrup of Succory, compounded with Rubarb, you ſhall make an Opiate of it, the Doſe of which may be from one drachme to two, and even to three for ſtronger Bodies.

There may alſo be made Pills, that ſhall have a vertue near the former in efficacy, to be taken in a leſs quantity. Take of the Extract of Aloes, made with the juyce of

of the cleanſed flowers of Violets, of the Extract of Rubarb, and of that of the Levant-Sena, of each two drachms; as much of the Volatil Salt of Vipers, as much of the Roſin of Scammony, and as much of the Gumm Ammoniac in drops; one drachme of Mineral Bezoar, and the like quantity of the Fixt Salt of Vipers. Reduce all into a maſs of Pills, of which the doſe ſhall be from half a ſcruple to two ſcruples.

Thoſe, whoſe ſtomach ſhall be troubled with tenacious humo s, ſuch as could not be carryed away by Purges, or other remedies; thoſe, that have a nauſeouſneſs, and are ſubject to troubleſome reſentments from the Stomach, may to good purpoſe uſe the following powder.

Take of Coriander-ſeed (that is not prepared with Vinegar, according to the ill way of the Antients, but ſuch as is ſold in good ſhops,) of Anis-ſeed, of ſweet Fennel-ſeed, of the root of Lickoriſh well ſcraped and dryed, of each half an ounce; three drachms of the Volatil Salt of Vipers, and as much of Crabs-eyes prepared; two drachms of the Fixt Salt of Vipers, and as much of well-choſen Cinamon. Bring all

to

to a fine powder, and adde to it its weight, or if you will, double its weight of fine powder'd ſugar. Cloſe this mixture in a Glaſs-veſſel, or in one of the fine white Earthen pots, and cloſe it carefully. You may take of it, at a time, from half a ſpoonfull to a whole, according as you have put more or leſs Sugar to it. You may alſo adde to the powder ſome drops of the Oyl of Anis, and of the Oyl of Cinnamon, and even of Musk and Ambre-gris.

This Volatil Salt is to very good purpoſe mix't among the Sneezing powders; for beſides that it penetrates exceedingly by its activeneſs, it alſo diſcharges the Brain powerfully, and withall fortifieth it. It may be mixed with the powders of Betony, Marjoram, Roſemary, Arabic, Stæchas, Sage, and the like, not putting but a ſixth part of our Volatil Salt among theſe powders.

Thoſe that would have an Opiate, proper not onely to fortify the Heart, the Stomach, and all the noble parts, but alſo to expell all kind of Venom, and all the impurities of the maſs of Bloud, and of the ſolid parts, and to make them iſſue out at the pores of the skin, or at the other emunctories,

ſtories, may prepare very beneficially the following Opiate.

Take two ounces of the Conſerve of Gilly-flowers, one ounce of the Confection of Alkermes, ambred and musked, ſix drachms of the Volatile Salt of Vipers well rectified, half an ounce of the Confection of Hyacinth, as much of the Electuary of *Diaſcordium*, three drachmes of the Mineral Bezoar; and of Pearl prepar'd, of Crabs-eyes prepared, of the Extract of Angelica, and of that of Carlina, of each of theſe the ſame quantity; two drachms of the Salt of Carduus Benedictus. Mix all together, and reduce it to an Opiate, by adding to it ſome Syrup of kermes, or the Clove-Gilly-flowers, as much as needs to give a good conſiſtence to the Compoſition: Which you are to keep cloſe for your occaſions. You may take of it, for a preſervative, half a drachm; at a time, in Wine, or broth; but in urging ſickneſſes, you may take of it a whole drachme, and even two drachms.

Thoſe that will uſe the Oyl which hath been drawn by Diſtillation, may either employ it all alone, or mingle it with an equal quantity of *Unguentum Martiatum*, and even

even adde to it Oyles distilled of Rosemary, Sage, Lavender and the like.

Those, that shall well consider these Receipts, will finde therein not onely a fit proportion in the dose of all the particulars, but also great cautiousness in mixing nothing with them, that may destroy or change the natnre of our Volatil Salt; which is the thing, most to be avoided in the exhibition.

We might here adde many other Compositions, of which the Volatil Salt of Vipers may be the Ground; but we have contented ourselves to deliver these for examples, knowing, that there may be found divers others, good enough, in Books, and esteeming, that 'tis better to prepare them upon occasion according to exigency, and following the Receipts, which able Physitians may prescribe thereof.

We have also explain'd ourselves sufficiently in all particulars. We would have been more large, if we had not apprehended we might exceed our bounds, and undertake things, which might be thought to be beyond our reach, and to belong onely to knowing Physitians.

Those that know well to prepare this Vo-

Volatil Salt of Vipers, and to unite it well with the Volatil parts of Plants, and with the Sulphureous parts of certain Minerals, that are friendly to our nature, may say, that they have made some progress in their Profession. We labour daily, and wish our selves able in time to impart something to the publick, that may be more accomplisht:

FINIS.

BRITISH MUSEUM

A

LETTER

OF

FRANCESCO REDI

Concerning

Some Objections made upon his

OBSERVATIONS

About

VIPERS:

Written to

Monſieur *BOURDELOT* Abbot, and Lord of *Conde* and S^t. *Leger*.

And

Monſieur *ALEXANDER MORUS*.

Printed in Italian *at* Florence, 1670.

Now made Engliſh.

Together with

The SEQUEL of NEW EXPERIMENTS upon *VIPERS*, and a Diſſertation upon their *Poyſon:* Serving for a Reply to a Letter written by Signor *Franciſco Redi* to M. *Bourdelot*, and M. *Morus*.

Written in French *by* Moyſe Charas.

Now likewiſe Engliſhed.

LONDON,

Printed by *T. R.* for *John Martyn* Printer to the *Royal Society*, at the *Bell* in S. *Paul's Churchyard*, 1673.

Jos: Banks

A LETTER OF
FRANCESCO REDI,

Concerning ſome Objections made upon his Obſervations about Vipers.

Written to

Monſieur *BOURDELOT*,

AND

Monſieur *ALEXANDER MORUS.*

SIRS,

FROM your liberality I have received the Book entituled *NEW EXPERIMENTS* upon *VIPERS*, learnedly compoſed by thoſe noble *Virtuoſi*, who during ſome months had met in the Houſe of M. *Charas* for that purpoſe. I have read it over more then once with great contentment, plainly finding that thoſe Worthy perſons have not ſcrupled by their eminent labours to confirm the Truth of thoſe Obſervations, which I alſo had made touching *VIPERS*, until the year 1664.

And indeed I think my ſelf much obliged to their ingenuity, and do frankly acknowledge, that whatever worth that rude and plain piece of mine may have, it hath received it from the honourable teſtimonies, given to it in *France*, where all the excellent Sciences and Arts do highly floriſh, to the admiration of thoſe that profeſs them in the other parts of *Europe*.

I intreat you, Sirs, that you would do me the favour to repreſent upon occaſion theſe my candid and cordial ſentiments, and withall to declare the high eſteem I have for that Book; the authority of which is ſo venerable with me, that, having found therein ſome few things directly contrary to my own Experiments, I have often doubted of my ſelf, and been almoſt ready to believe, that I dream'd when I made, and when I wrote them. But ſome of my Learned Friends, that were frequently preſent at thoſe my Operations, have laughed at me for that proneneſs of my belief, and between jeſt and earneſt aſſur'd me, that thoſe Experiments had by no means ſo ſucceeded with me in a dream. Notwithſtanding which, without any regard to their aſſeverations, I reſolved to iterate

and

and reiterate them, and that with ſo great and careful diligence, that I ſhould greatly injure my ſelf and Truth, if I ſhould not freely and candidly tell you, that all thoſe four or five Experiments, which to thoſe Gentlemen in *France* have not ſucceeded, do ſucceed with me in *Italy* without fail, as they were formerly recorded by me; on the contrary, thoſe will not ſucceed with me that have been made in *France* and are contrary to mine.

And ſince you may perhaps have the curioſity as to deſire to know of what kind they are, I ſhall here give you a brief account of them; aſſuring my ſelf, that it will be acceptable to all the Lovers of Truth, but eſpecially to the Authors of the Book of the *New Experiments*, who have been induced to write by no other motive then the ſole deſire either to confirm or to find the Truth of a matter ſo curious, of which ſo many underſtanding men have written.

In my Letter then of the *Obſervations about Vipers*, addreſſed to the Illuſtrious *Lorenzo Magalotti*, ſpeaking of the Poiſon of thoſe creatures, both what it is, and in what part of the Body it reſideth, I af-

firm'd (as I affirm ſtill) that the Poiſon of a Viper is nothing elſe then a certain yellowiſh liquor, which lodgeth in the veſicles that cover the greateſt teeth of the Viper; and that that Juice is not only poiſonous, when it is ejected by the live Viper when ſhe biteth, but alſo when 'tis collected from a dead Viper, and even ſuch an one that hath been dead many days, provided it be made to paſs into a wound, and remain there. Moreover, I added, that this ſame liquor, when taken down into the ſtomach, is not deadly, no not ſo much as noxious. And this was my opinion, which hath been confirm'd to me by innumerable Experiments, made with the greateſt exactneſs I could employ.

But the Authors of the Book of the *New Experiments* do reſolutely write, That that above mention'd Liquor is not poiſonous, but a meer and a moſt innocent *Saliva* or Spitle. Thence they go on to affirm for an undoubted and experimented Truth, that the Viper hath no part of her body, neither limb nor humor, able to poiſon; and that all her poiſon conſiſts in the ſole imagination of the Viper, irritated and made angry by the *idea* of vengeance, which

ſhe

ſhe hath conceived in her head; by the means whereof the ſpirits being put into a violent motion, are darted through the Nerves, and at times through the Fibres of the cavities of the Teeth, by which cavities thoſe ſpirits are carried to infect the blood of the animal, by the opening made with the biting teeth. In ſhort, they conclude, that if a Viper be not angry, and have not that vindicative imagination, her bitings do never poiſon, but are very innocent, cauſing no miſchief at all to him, in whom they are made. For theſe are their words;

Pag. 36. in the Engliſh Verſion, *Theſe conſiderations, ſupported by many Experiments made by Us, and to be related hereafter, have induced me to call theſe Glands* Salival, *and to aſcribe to them the very ſource of that yellow liquor, which hath been ſo much decried, and withal ſo little known; and is nothing elſe, but a pure and a very innocent Spitle. I hope that thoſe who ſhall take the pains of examining after me, theſe Glands, and this Juyce of the Gums, will not ſtick to give me their ſuffrages.*

Item p. 105. 106. *But not to ſtay upon principles ſo ſlightly eſtabliſhed, and ill maintain'd, foraſmuch as we have on our ſide a*

great number of Experiments, upon which we are grounded: We ſay, that this Juice is nothing but a pure and plain Saliva, *of which we have already obſerved the uſe; and that this Juice contributes nothing to the venomouſneſs of the Biting, ſince being taſted and ſwallowed (as we have often experimented) it doth no hurt to man or beaſt; and ſince alſo, being put upon open wounds, and upon inciſions made in the fleſh, the ſame being rub'd therewith, and mingled with the blood, it annoys nothing at all; notwithſtanding the judgment of a Perſon very intelligent, and particularly in this ſubject of Vipers, who aſſures to have made a great number of* Experiments, *which being contrary to ours, the great opinion we have of the abilities and the ſincerity of that famous man, hath obliged us to employ the more care and exactneſs, and to confirm our ſelves by a very great number of* Experiments, *which have alwayes been found alike in the truth we here aſſert, and of which we ſhall make evident and irrefragable proof.*

Item p.cog. *We conclude therefore, that the imagination of the Viper, irritated by the* idea *of revenge, which ſhe had framed to her ſelf, gives a certain motion to the ſpirits, which cannot be expreſſed, and puſhes them violently, through*

through the Nerves and their Fibres, to the cavity of the teeth as into a funnel, and that from thence they are conveyed into the blood of the animal by the opening, which they have made, there to produce all those effects, of which we endeavour to give a reason.

Item pag. 111. *However this be, we must herein agree, that this irritation in the fansie or in the spirits of the Viper, is the main cause of the activity and piercingness of its venom, and that without it the biting would not produce such surprising effects, as those are, of which we have related so many examples.*

Item pag. 138. *These Experiments will prove on the one hand, that the yellow liquor contributes nothing to the poyson; and on the other, that these incensed spirits, assisted by the openings, which the great teeth had made for them, are the sole and true cause thereof.*

These sentiments they confirm by some Experiments, all which consist in this, that they had drop't a quantity of that yellow liquor into the wounds of a Pigeon, a Dog, and some Pullets, which yet dyed not of it; and that having caused a Pigeon to be bitten by a Viper not enraged, the animal received thence no hurt at all. For they say,

Ray pag. 115. *We also made a trial upon a Pigeon, which we wounded under the wing and in the Leg in the same moment of time; and we let into each wound some of this yellow liquor, which just afore we had drawn from the gums of two enraged Vipers; then we rejoyned the skin well, to enclose the said liquor, and we bound both wounds over with a band, that nothing might run out. We can assure, that the Pigeon felt not any inconvenience from it, and that we even found upon the wound, made in the Leg, a coagulated drop of the juice, round, and of the same colour as we had put it there, and the blood of the wound dryed, and that, soon after, both wounds were dried up, and healed of themselves.*

Pag. 116. *We also made the like Experiment upon a Cat, which we purposely wounded in the Leg, but he received no harm at all by it: We have also often experimented it on Pullets, and other Pigeons, but alwayes with the like success, and without any offence to the Animals.*

Ibid. *The same Trial hath been thrice made at three several times, and even twice in one day upon a Dog, whom we had wounded on purpose towards the bottom of the Ear, where he could not lick his wound; and no mischief at all followed upon it.* Ibid.

Ibid. *We cannot but add here an Experiment of the mortal effect of the Enraged Spirits, without any intervention of the yellow liquor. We made a Viper ſeveral times to bite upon a ſlice of bread, by preſſing every time its jaws againſt the bread; and we did this ſo often, that not only that juice was altogether exhauſted, but the blood began to come out of the Veſſicles. At the ſame time we vexed the Viper, and made her bite a Pigeon in the moſt fleſhy part; and we obſerv'd that indeed the effects of the venom of the biting were not ſo quick, the Pigeon not dying but an hour and an half after it had been bitten; but then we found alſo, that the teeth of the Viper were in a manner covered with the crums of the bread, from the force of her having bitten at it, and that that had hindred them from making a deep entrance; and that having half ſtop't up the pores of the teeth, a good part of the angred Spirits could not come forth; ſo that the death of the Pigeon could not follow ſo faſt, though yet it hapned without any mixture of the juice, which had been altogether emptied.*

Pag. 138. *The wound made by a Viper not vexed, whoſe Jaws were held in, and whoſe teeth were at the ſame time thruſt into*

the body of a Pigeon, which alſo was accompanied with ſtore of the yellow juice, and yet not attended with any ill accident.

To theſe Experiments I have nothing elſe to oppoſe, but thoſe very many ones, that were made by me in the year 1664. and recited in the above-mentioned *Obſervations* of mine *about Vipers*, and thoſe alſo that I ſhall recite hereafter, made likewiſe by my ſelf, not with a deſire to confirm the firſt, but indeed to diſcover the Truth. And, that I may not be put often to repeat ſome things, I ſhall premiſe ſome General Obſervations, made by me at the time when I dealt in Vipers.

1. A viper more eaſily kills a Pigeon, a Pullet, a Turky-cock, a Squirrel, a Dormouſe, and generally all ſmall Birds and Animals, than a great Animal, as a Sheep, a Deer, a Horſe, a Bull; yea theſe greater ones and thoſe that are of an hard skin, very often a Viper kills not at all.

2. According to the bigneſs of the Animal bitten, and according to the place where the Viper biteth, death follows ſooner or later; eſpecially according as the place wounded is a clear texture, or thick ſet with veins and arteries; or thoſe veins and arteries are very ſmall or big. 3. If

3. If from the wound of a Viper much blood iſſueth, it ſometimes happens, that the Animal not only dyeth not, but does not ſo much as feel any great inconvenience.

4. It doth alſo not ſeldom fall out, that an Animal bitten by a Viper ſuffers grievous Symptoms from the poyſon, which bring it near death, but yet kill it not; but the creature without any help of Phyſick and by the ſole work of nature recovers.

5. Thoſe Animals that are bitten of a Viper dye a little ſooner, than thoſe, into the wounds of which hath been on purpoſe conveyed that yellow liquor, which by art hath been fetch't out of the baggs of the teeth of that Viper.

6. 'Tis neceſſary, that great dexterity be uſed in making the ſaid liquor to penetrate into the wound; becauſe, if the wound be narrow, it pierces difficultly; if large, it cannot be otherwiſe but it will bleed, and with that blood the ſaid liquor will turn back, and ſo the poiſon come out again.

I had then provided a good number of Vipers which I cauſed to be brought me out of

of the Kingdome of *Naples*; and having in this moneth of *May*, 1670 wounded ten Pigeons of the bigger ſort in the thighs, I put into them ſome of the yellow liquor freſhly taken out of the mouth of the live Vipers; and all theſe Pigeons, ſome within the ſpace of one hour, ſome in half an hour, and ſome in two hours, died. This Experiment I repeated upon ten Chickens, likewiſe wounded in their thighs, with the ſame event that had befallen the Pigeons.

Then I cut off the heads of twelf Vipers, and all the heads being cut off, and the Vipers quite dead, I thence extracted the poyſon, and cauſed them to be put into the wounds of eight Turtle-doves, all which died in the ſpace of half an hour.

In the month of *June*, having killed many other Vipers, and gather'd out of the bags of their teeth and their gums all the yellow and viſcous Juice that was there, I anointed therewith ſome beeſom-rods, ſharpn'd like arrowes, and immediately I pricked with them ten young Pigeons in the more fleſhy part of their cheſt, leaving them fixed in the wound; and the Pigeons ſurvived not above two or three hours. But leſt it ſhould be doubted; whether theſe Pigeons died not

of

of the wound it ſelf, enraged by the punctures of thoſe rods, I made a trial upon four other Pigeons with rods not infected with that poyſonous liquor; but none of them dyed, though the wounds became purulent.

I alſo took eight heads of Vipers, cut off ſix hours before, and, the Vipers being quite dead, I cauſed eight Turtle-doves to be bitten by them in the thigh, and not one of them eſcaped.

Moreover I made the heads of fifteen Vipers to be cut off: and put them into a glaſs-veſſel well cover'd, having laid them upon one another, that ſo they might remain moiſt. Four dayes after, I ſtruck with thoſe heads five young Cocks, and five great Pigeons in the thigh, and they all after a little while died. The like fell out with other Viper-heads, which having been killed ſix dayes before, had in all likely hood loſt all choller and thoughts of revenge. And to prevent all Objections that might be raiſed on this occaſion, I ſhall not omit to relate to you, that about the beginning of *Auguſt* when two of my Vipers, that alone were left me in a box, died of themſelves of ſickneſs, I cauſed two Turtle-doves to be ſtruck by

by them, which also, like the former, dyed in less than an hours time.

But I may go further. I had collected in a glass all the poisonous liquor of the heads of two hundred and fifty Vipers, to make various Experiments therewith upon occasion. But being by much business hindred, I delayed to accompliſh my design: Whence that liquor turn't first into a glew, colour'd like amber; then in 30 dayes it became altogether dry and friable, so that it could easily be reduced to powder Being pulverised, I had a mind to try, whether that powder, let into a wound, did keep the force of poysoning; and I found that really it did so, all those Pullets, Pigeons, and Turtle-doves, into the wounds of which I had put some thereof, dying of it in a little while.

Having made this Experiment, I began to doubt, whether that poyson of the arrowes of the King of *Macassar* in the Island of *Celebes*, which commonly are called the arrowes of *Bantam* in *Java Major*, were not the poyson extracted out of the mouth of some Viper, or of some other Viper-like serpent, and perhaps of a more maligne nature becaus̃e of the diversity of the Climate.

I am not much averſe from believing this to be ſo; and it may be confirmed by what I have read in *Pliny*, *viz.* That the *Scythians* did infect their Arrows with a Viperin poiſon. His words are, *Scythæ ſagittas tingunt Viperinâ ſanie & humano ſanguine: irremediabile id ſcelus mortem illicò levi tactu affert.* And this was perhaps extracted by *Pliny* out of *Ariſtotle*, who in his Book, intitul'd Περὶ θαυμασίων ἀκουσμάτων, ſoon after deſcribeth the proceſs of preparing it, which I dare not affirm to be the true one, or to require ſo many circumſtances and cautions. And who knows, whether the Arrows of *Hercules*, of which the Fables alledge that they were imbued with the blood of an *Hydra*, were not infected with this poiſon of Vipers? So 'tis believed by *Diodorus Siculus*, when he ſaith, Τῆς ἀνιάτου τὴν ἐκ τῆς ἐχίδνης ἰὸν ἀνειλεφυίας. And *Ovid* gives the name of Viper to the *Hydra*, when in his ninth Book of *Metamorph.* he ſaith;

Pars quota Lernææ ſerpens erit unus Echidnæ.

And afterwards;

——— *Capit inſcius heros,*
Induiturque humeris Lernææ virus Echidnæ.

To which may be added, that *Philoctetes*, the Heir of the Bow and Arrows of *Hercules*, being gon in the Grecian Navy to the *Trojan*

War, and having unawares wounded himſelf (as *Servius Grammaticus* relates, *l.*3. *Æneid*) with one of his Arrows in the foot; was left among the Grecians in the Iſle of *Stalimene*, by reaſon of the violence of the pain, and the intolerable ſtench of the wound. Whence *Sophocles*, alluding, it ſeems, to the kind of poiſon, in a Poetical way and phraſe relateth, that *Philoctetes* was left in that Iſle, becauſe he had been bitten by a Viper. His words are;

Ὦ τέκνον, ὦ παῖ πατρὸς ἓξ Ἀχιλλέως
Ὁ δ' ἐγὴ ἐγώ σοι κεῖνος, ὃν κλύεις ἴσως
Τῶν ἡρακλείων ὄντα δεσπότην ὅπλων,
Ὃ τοῦ Ποίαντος παῖς Φιλοκτήτης; ὃν οἱ
Διοσοὶ στρατηγοὶ χὠ Κεφαλλήνων ἄναξ
Ἔρριψαν αἰσχρῶς ὧδ' ἔρημον, ἀγρίᾳ
Νόσῳ καταφθίνοντα, τῆς δ' ἀνθρωφθόρου
Πλήγεντ' ἐχίδνης ἀγρίῳ χαράγματι: *That is*

O Son of Achilles, *I am he, whom thou mayſt have heard to be the poſſeſſor of the Herculean Arrows, the Son of* Pæan Philoctetes: *whom the two Armies and the King of the Iſle of* Cephalene *ſhamefully left lying here, pining away by a cruel diſeaſe, ſtruck by the fierce bite of a murthering Viper.*

And *Cicero* himſelf in his ſecond Book of the *Tuſculan Queſtions*, and in his Book *De Fato*, and many other Writers do follow this opinion, *viz*, That *Philoctetes* was bitten by a Vi-

a Viper. And possibly all of them had an eye not only to this place of *Sophocles*, but also to what *Homer* said before, in his sixteenth Book of *Iliads*.

And though against this conjecture it may be said, that the poison of Vipers is inconsiderable in respect of what Poets do write of the Arrows of *Hercules*, which by them are said not only to have the force of killing without fail, whether the wound be small or great, as happen'd to the Centaure *Chiron* and to *Nessus*; but also that the blood of their wounds was become so pestiferous as to infect any live body whatsoever, touched thereby, and that with such violence, as to make the flesh fall off from the bones: which, *they add*, was experimented by *Hercules* to his great mischief, when his Shirt was tinged with the blood of *Nessus*; whence *Ovid* saith,

Victa malis postquam est patientia, reppulit aras
Implevitque suis nemorosam vocibus Oeten;
Nec mora, letiferam conatur scindere vestem;
Qua trahitur, trahit illa cutim (fœdumque relatu)
Aut hæret membris, frustra tentata revelli,
Aut lacertos artus & grandia detegit ossa:

This is a Poetical Fable; whence, I am apt

to believe, is raiſed that relation concern-ing the Arrows of *Macaſſar*, of which 'tis ſaid, that they kill one in that very moment he receiveth the ſlighteſt wound thereby, and that alſo in the ſpace of half an hour the fleſh of the killed perſon becomes ſo putrified, that it falls off from the bones in many pieces, whence do exhale ſuch virulent ſteams, that if they light upon any ordinary and not envenomed wound, they mortally infect it, and without fail kill the Patient.

I do here affirm, that I have made many tryalls with thoſe Arrows of the Indians, but have not found them in *Tuſcany* of ſo fierce and malignant a nature, as hath been related. The Dogs I wounded with them, dyed ſome of them in ſix, others in ſeven, others in twelve, others in twenty four hours. And their fleſh was not putrified, nor fallen in pieces, nor did their blood or exhaled ſteams at all kill other wounded Animals. But I have often obſerved, that, if one intends to kill with theſe Arrows, it is not enough to make a ſimple inciſion of the fleſh, but he muſt by art make them ſtick a while in the wound (which is like to what happens in putting into wounds the powder of the dryed yellow liquor of Vipers:) Whence it is that thoſe Savages make of Wood the ſharp ends

ends of thoſe Arrows, imbue them with poiſon, and then joyne them to the Arrow ſtick in ſuch a manner, that thoſe ends ever remain in the wound, whether the Arrow do break or be drawn out; as came to paſs in the Siege of *Jeruſalem* to thoſe Heroes of *Flandres*, *Godofred* and *Robert*, of whom that great Florentin Poet thus ſingeth:

Soſpingeva il monton, quando è percoſſo
Al Sig. de Fiaminghi il lato manco,
Si che travia s' allenta, è vuol poi trarne
Lo ſtrale, e reſta il ferro entro la carne:

That is,

The Engine diſcharged, the left ſide of the Flandrian Princes was ſo ſtruck, that they were thruſt out of their way, and when they would draw out the Arrow, the Iron ſtuck within their fleſh.

It is therefore neceſſary, that the Arrows do ſtick for ſome time in the wound, if they ſhall kill: Whence I underſtand not, how the vulgar comes to fanſy, that the Blades of Swords may be envenomed. I do well remember, that with the yellow liquor of Vipers, and with other things eſteemed venomous, I have ſometimes ſlightly tinged Lancets for letting of blood, and with them have cut the vein of ſome Animal or other, but death hath not followed upon it. Let ſuſpe-

ding men rather beware of the Tents of Chirurgions; for 'tis too hard to cauſe death by poiſon'd Lancets or other ſuch Iron inſtruments. Hence it ſeems to me to favor of the fable (though the caſe be different) that *Pariſatis* the old Queen of the Perſians, did poiſon her Daughter-in-law by the hands of her Carver, poiſoning the one ſide of the Knife, and therewith cutting aſunder a Fowl, of which he gave to the young Queen to eat that part, which the poiſoned ſide of the Knife had envenomed, eating the other part himſelf.

I could never ſee the truth of what is related of poiſons killing by a meer and momentaneous contact, or by vicinity alone; as that Stirrups, Sadles, and Benches have been poiſoned, and thereby proved mortal. Let him believe it that will; I cannot. And what a certain modern Writer relateth for a great truth, concerning a prodigious accident hapned by a kind of Serpents bred in the Indies, I muſt leave to himſelf, who ſaith, *After I have ſpoken of theſe Serpents, I preſume it will not be unacceptable to give an account of the ſtrange effect they produce. If perchance it happen, that they paſs over a cloath or ſhirt dryed in the Sun, there is wont to be bred in the Kidneys of thoſe that uſe this cloath, a certain kind*

kind of Serpents, which little by little growing up do encompaſs the whole body, and when their tayl reaches their head, to conjoyn the circle, then death is unevitable: Wherefore, to avoyd this miſchief, they kill them with Razors and Lancets, to prevent their growth.

You have found above mentioned three perſons, wounded by the Arrows of *Hercules*, namely *Chiron*, *Neſſus*, and *Philoctetes*. The two firſt dyed ſuddenly; the third, after a long ſickneſs eſcaped. If the cauſes of this difference were to be given (whether it be an Hiſtory or a Fable) I ſhould ſay, that *Neſſus* and *Chiron* dyed, becauſe they were wounded whilſt *Hercules* was yet living, by Arrows freſhly envenomed; beſides that *Neſſus* was pierced through his heart, as *Ovid* hath it,

Jámque tenens ripam miſſos cùm tolleret artus,
Conjugis agnovit vocem, Neſſóque paranti
Fallere depoſitum; quò te fiducia, clamat,
Vana pedum violente rapit? Tibi, Neſſe biformis
Dicimus, exaudi, nec res intercipe noſtras.
Si te nulla mei reverentia movit; at orbes
Concubitus vetitos poterant inhibere paterni.
Haud tamen effugies, quamvis ope fidis equinâ,

Vulnere, non pedibus, te consequar. Ultima dicta
Re probat, & missâ fugientia terga sagittâ
Trajicit; extabat ferrum de pectore aduncum:
Quod simul evulsum est, sanguis per utrumque foramen
Emicuit, mistus Lernæi tabe veneni.

But *Philoctetes* was wounded long after the death of *Hercules*; whence 'tis credible, that those Arrows had lost much of their poisonous force, even as the powder of the yellow liquor looseth of its force, and the Arrows of *Macasser* by length of time grow languid; which though they poison and kill if one be wounded therewith, yet do they no hurt at all, if their poison be swallow'd and taken into the stomach. Which Experiment I have tryed upon two Doggs, to whom I gave to swallow two pieces of flesh covered with the powder of the scrapings of such Arrows; as also upon several Chickens, to whom I gave the water to drink, wherein those shavings had been a long time infused.

But, to return after this long digression to the main thing; you may by the above related and often repeated Experiments, see, that the poison of the *Italian* Viper consists not in an imaginary *idea* of anger raised to revenge, but rather in that yellow liquor, which

which is voided out of the bags of the bigger teeth of Vipers; which juyce if it chance to be ſpilled in the mouth and upon the Pallat of thoſe animals is able to envenom the ſpittle which moiſtens their throat.

I ſhould think it very well worth while for thoſe learned Authors of the book of the *New Experiments*, that they would pleaſe to make their Experiments anew. And if they ſhall find them conform to thoſe they have already publiſhed, and really contrary to mine, then we may unanimouſly conclude, that we have lighted upon a truth hitherto unknown; which is, That the Poiſon of the *French* Vipers conſiſts in an imaginary *Idea* of a revengeful anger; but that of the *Italian* ones hath its ſeat in that yellow liquor, ſo often mentioned by me. But if on the other ſide, the *French* Experiments ſhould not hold, then it may be affirmed, that the *French* as well as the *Italian* Vipers are of one and the ſame nature; and have the ſame kind of poiſon.

Wherefore if in *Italy* the Viperin poiſon certainly lodges in that yellow liquor, it will be no untruth in me to affirm, that if by biting, a Viper ſhould have loſt all that juyce reſiding in thoſe bags, and that alſo which may be furniſht by the neighbouring parts, it will

will, I ſay, be no untruth in me to affirm, that the ſubſequent bitings will not be mortal: which is the thing I have theſe many years aſſerted, and do ſtill aſſert, although the aboveſaid Authors deny it, giving out that one only Viper, being vexed and ſwell'd with choller, is able to kill as many animals as she bites; they truſting to one Experiment, in which they ſay there died five young Pidgeons by the biting of one only Viper. *We hope* (ſay they, p. 137.) *that among the many Experiments thoſe of the five Pidgeons, bitten one after another, by one and the ſame viper exaſperated every time, and of which the laſt bitten died firſt of all, when the viper was moſt vexed, and moſt exhauſted of its yellow liquor*, &c.

I am willing indeed to believe the fact to be true; but for the confirmation of it I wiſh they had cauſed many more ſuch Pidgeons, and many other animals, of different kinds and bigneſſes, to be bitten of the ſelf ſame Viper, which had killed thoſe five ones, to ſee whether that angry and cholerick poiſon had an infinite power. For when I examin'd this matter, I choſe about the beginning of *May* a Female Viper, one of the biggeſt and luſtieſt, and vexed her to bite ten Chickens one after another, in the right thigh; of which

the

the firſt, ſecond, and third died almoſt in an inſtant; the fourth ſeemed only to be ſick; but the fifth and all the reſt did not only not dye, but were not at all ſick; and yet every time the Viper did bite, I angred and madded her exceedingly. In the moneth of *June* I repeated the experiment in five tame *Ducks*, bitten by one and the ſame Viper, which alſo immediately after bit three young *Turtle-Doves*. The firſt wounded Duck dyed three hours after; the ſecond, five hours after; but the reſt eſcaped. 'Tis true, that the firſt wounded of the Turtles dyed, but not the other two. Of twelve *Ring-Doves* at one time there dyed but four; but the next day of twelve others there dyed ſix. Of five *Rabbets* there dyed three; and of three *Lambs* the two laſt lived, the firſt of them dying two hours after it had been bitten.

I ſhould be too tedious, if I ſhould relate to you all the other experiments: Wherefore I ſhall go on to add, that having written in my *Obſervations*, that that yellow liquor was not conveyed to the bags of the teeth from the bladder of gall, I did ſuggeſt, whether it might not be diſgorged there by certain ſeveral *Ductus's*, that might be inſerted at the head of them: which did appear the more probable, becauſe that in all Vipers at the bottom

bottom of thoſe veſicles I had always found two glanduls, which had not, that I knew, been obſerved or deſcribed by any body. Whereupon the Authors of the *New Experiments* do affirm, that they could never ſee ſuch Glanduls as I had named; but that inſtead of them they had found two others, which they call Salival, thus by them deſcribed, *p.* 31, 32. *I believed at firſt, following Signor* Redi, *that there might be Salival veſſels in Vipers, as there have been lately found in Man and divers other Animals; ſo that after many re-ſearches made with ſufficient attention and patience, in many Vipers heads I diſcovered at length ſuch Glands, proper to forme this juyce, and to convey it to the Bags; and after I was well perſwaded of it my ſelf, I ſhewed them to divers of thoſe knowing Phyſitians, that had met at my houſe the laſt year. Theſe perſons had a mind to ſee them with their own eyes; and after I had well examined the parts which I ſhewed them, they not only found them true, but they alſo ſaw there a greater number of ſmaller veſſels then had appear'd to me, of which ſome that are Arteries and Veins paſs above the Glands, and others that are Lympheducts run below; ſo that they judged, that I could confidently aſſert and deſcribe theſe Glands which I call Salival, and which they had acknowledged together with me;*

me; though Signor Redi *durſt not ſpeak poſitively of them, becauſe he had not diſcovered them; neither had they been deſcribed by any Author of their knowledge, nor by any one of mine.*

And pag. 35. *As to the ſmall Glands, which* Signor Redi *hath obſerved at the bottom of the Veſicles that contain this juyce, I can ſay, that I have with great care and diligence ſearched after them, and that 'tis true, I have there found the appearances of Glands, but having opened them, I ſaw nothing in them but ſmall teeth that were faſtned there, without finding any thing of a Glandular nature there, nor that did in the leaſt approach to the ſhape, ſubſtance, or qualities of the Glands which I have been deſcribing*, &c.

I do not at all wonder that thoſe Writers have not found thoſe Glanduls I named, I ſeeing they went about to ſearch them within the Veſicles of the teeth, and at the bottom of them: Whereas I never ſaid that they were to be found within them, I ſaid they were to be found *Sotto 'l fondo* (under the bottom) of thoſe bags, and in good *Tuſcan* language, tis another thing to ſay *nel fondo*, (in or at the bottom) another *Sotto 'l fondo* (under the bottom.) And therefore when they ſought them where they are to be met with, they eaſily found

found them, and they are the ſame which they deſcribe, neither are there any other conſiderable glanduls to be diſcovered in the heads of Vipers. Nor could I at all write that thoſe Glanduls lay in the bottom of the Veſicles, if I was of opinion that the yellow liquor did run into them after it had paſſed through the Salival Conduits, which yet I imagined might have their origin from, or connexion with thoſe two Glanduls ſeen by me, and therefore muſt needs be in a ſcituation a little diſtant from the Veſicles, and not in the bottom of them. Now whether theſe Glanduls have this office and this uſe, I intend not now to ſpeak of, let it be what it will, 'tis too inconſiderable a matter to make any more words of it.

I confeſs, that the dangerous experiments which Vipers have, made them ſo diſpleaſing to me, and even ſo odious, that I reſolved not at all to meddle any more with them; but that I was tempted thereto by a great deſire I had experimentally to learn, whether the volatil Salt of Vipers, Chymically prepared, were endowed with that preſent and infallible vertue of curing the bitings of Vipers, as the ſaid Writers affirm. For my *Genius* keeps me from much truſting to thoſe things, that have not been made out to me by Experiment; although I do not preſently reject them

them as falſe before Experiment, but rather being deſirous to know whether they be true, I put them to tryal: But neither do I acquieſce in one or a few experiments, but I love to ſee more and more, being ever apprehenſive leſt I ſhould be deceived; as it often hath happen'd to me, when I have been ready to confide in one haſty experiment. And to ſay truth in the moneth of *June* there wanted not much but that I had impoſed upon my ſelf in the tryal of an experiment, which I am going to relate to you, and which done I ſhall eaſe you of further trouble.

Having read them in the Book of the *New Experiments*, that the Head of a Viper, being eaten of an animal, bitten by another Viper, did certainly cure the wound; and the thing being by me looked upon as very uſeful, excellent, and admirable, I had an eager deſire to try it my ſelf, that I might ſpeak of it with more confidence, although thoſe learned men had made theſe two following experiments of it, *viz.* pag. 120. *We had alſo a deſire to find whether a Viper being eaten by an animal, which ſhe had bitten before, would be cured of that biting. We therefore cauſed to be ſlightly broiled the head of a Viper, which had on it a part of the neck, newly ſever'd from the body; and we cauſed a Dog to be thrice bitten at the ear, by a well*

enraged

enraged Viper, in ſuch a manner that the blood came out at the three pricked places. We ſoon caſt before him the head and neck broiled, and yet hot. The Dog, that was hungry, and felt not ſo ſoon the effects of the bitings, immediately ſeized on the head, bruiſed it between his teeth, and ſwallowed it down. After which we ſtay'd a pretty while to ſee, whether the three bitings would prevail over the devour'd head and neck; but the Dog was free, except ſome blewneſs and a little Tumour he had at the places bitten, but which little by little vaniſht in three or four days. We made alſo a Dog to be bitten three times in the ſame place, and without broiling the head of the ſame Viper that had bit him, we caſt it before him, hoping that he would eat it, becauſe he had not eaten any thing for many hours before; but the Dog would not touch it. Upon that we bruiſed and ſtamped that head in a mortar, and ſo cram'd it down the Dogs throat, rubbing alſo the bitten places with the blood of the ſame Viper; which done, we expected the ſucceſs, which was, that this head, raw and bruiſed, and if you will, aſſiſted by the blood of the Viper, being applied to the part bitten, had produced the ſame effects with the former, which had been ſlightly broiled; in regard that this Dog was ſafe, excepting thoſe inconveniencies the former ſuffer'd, and was after that as ſound as if he had never been bitten.

If

If these two Experiments had been made before that Gentleman, above discours'd of, was bitten by a Viper, we should have been in much less anxiety for his preservation.

And a little before (pag. 119.) they had said: *We have tryed, that having caused to be bitten at the thickest place of the car, by a sufficiently vexed Viper, a young Cat, very lean, that had but just before eaten the Eggs, the Matrix, and all the Guts of a Viper; the biting had almost no effect, and there appeared nothing but a very little swelling, and a very inconsiderable lividness in the part bitten.*

And pag. 154. *It is very certain, that the Head of a Viper, broiled and swallowed, healeth the biting of that Animal. The Heart and the Liver may do the same. Reason and Experience have confirm'd it; and therefore in an urgent occasion these parts may be very beneficially employed.*

And pag. 156. *We believe, that the Liver swallowed is capable to heal the biting of a Viper, like the heart, flesh and other parts, of which we have spoken; and that it may much facilitate the delivery of Women with Child, as doth the Liver of Eeles.*

Hereupon I resolved to imitate those Gentlemen, and having given a Vipers head half boiled to a chain'd young Dog, I caused him

immediately to be bitten by an other Viper in the right ear, but the Dog dyed not, nor did he appear to me to have any other inconvenience than that he ſtood as 'twere amazed, and looking grim, and melancholly, for four or five hours ſpace. I ſoon reiterated the ſame Experiment upon another Dog, which having been forced to ſwallow the head of a Viper, raw and bruiſed in a Mortar, gave no ſign of any great poiſon, and had very little and almoſt no ill enſuing. Whence I was ready to reckon this Experiment among things proved and true, when a doubt coming into my mind, obliged me to cauſe two other young Dogs to be bitten in their ears, who although they had not eaten the counter-poiſon of a Vipers head, yet dyed not. Whence the ſuſpicion being increaſed in me, I cauſed to be brought me the raw head of a Viper, and crammed it into the throat of a young Pullet, and then had its left thigh bitten by a Viper; whereupon it preſently fell to the ground, and in a little more then the eight part of an hour died. Whence the ſuſpicion growing ſtill greater, about ten a clock in the morning I made a Capon to eat two raw heads of Vipers, and afterwards about twelve a clock I made him ſwallow two others, and without loſing any time I cauſed him to be once

bitten

bitten by a Viper in the thigh, and the Capon immediately dyed, without finding any good in the four ſwallow'd heads. The next day I prepared for two young Dogs a diſh of Viper-heads parboiled, but they would not eat them, and we were forced to cramm them down: Soon after, the leſſer of the two Dogs was bitten in the thigh near the groin, and the bigger in the tongue; and they both dyed. And in the like manner dyed eight Chickens, two Kitlings, two young Hares, and ſix Turtle-Doves, likewiſe bitten by Vipers, and Phyſiqued not only by their heads, both raw and boiled, but alſo having their wounds waſhed with the Viper-blood. And I remember, that I cauſed thoſe 6 Turtle-Doves to be bitten not by the heads of live Vipers, but by thoſe of dead ones, and ſuch as had dyed two days before. Moreover, I continued for three days ſucceſſively to cram two ſuch other Doves with Viper-fleſh, and gave them no other drink then the broth of that fleſh; and yet they could not eſcape death, being bitten by a Viper.

Whence I am inclined to believe, that in *Tuſcany* the fleſh of Vipers is no help or remedy, at leaſt no conſiderable one, to Animals bitten by Vipers. Mean while I refer my ſelf to the Learning, Experience, and Authority

of those noble persons, to whom I do most willingly submit this or any other opinion of mine, and with whom I would never entertain a controversie. For I should apprehend lest it might befall me, what *Marcus Tullius* was wont to say of *Cato*, viz. That it was not less troublesome to him to answer to the authority of *Cato*, then to his strongest arguments.

For the rest, I earnestly intreat you, *Sirs*, that you would pardon the rudeness of this my Letter, sufficiently appearing to have been written by a person full of business, rather then enjoying leisure; and that you would please only to regard the naked truth, which without any passion I did undertake to relate.

A CON-

A CONTINUATION

Of the

NEW EXPERIMENTS

CONCERNING

VIPERS:

TOGETHER

With a Diſcourſe touching their Poyſon: By way of Reply, to a Letter written by Signor *FRANCESCO REDI*, to Meſſieurs *BOURDELOT* and *MORUS*; Printed at *Florence*, 1670.

By *MOYSE CHARAS.*

Engliſh'd out of French.

LONDON,
Printed by *T. R.* for *John Martyn* Printer to the *Royal Society*, at the *Bell* in S. *Pauls Churchyard*, 1673.

A CONTINUATION
Of the
NEW EXPERIMENTS
CONCERNING
VIPERS.

Finiſht in the Preſs at Paris, *Auguſt* 4. 1671.

I Believed, I had ſufficiently eſtabliſh'd my opinion touching the *Poiſon* of *Vipers* by abundance of Experiments, ſupported by Reaſons, heretofore made publick: But there hath ſince appear'd at *Paris* a Letter of Signor *Redi*, in which he oppoſes my ſentiments: And he being a perſon, whoſe merit hath acquir'd him a great reputation among the Learned, that Letter of his hath not been without making ſome impreſſion in the minds of many, and in ſome even of thoſe, that had reliſh'd my opinion, in

favour of which they ſeem'd to have already declared themſelves.

I might indeed have defended my ſelf as to that which is againſt me in that Letter, ſoon after it appear'd; having reaſons ſtrong and numerous enough to maintain and juſtifie all I had advanced in my writing: But I thought it better to deferr it till Spring, to the end that after I ſhould have made New Experiments, and the more aſſur'd my ſelf of all, I might, by a renew'd knowledge of the truth, afterwards the better perſwade the publick thereof. It will therefore appear by this Sequel of Experiments, here ſet down, that I am ſo far from changing my Opinion, that I have reaſon to be more ſtrongly than ever confirmed in what I embraced at firſt.

I do herewith ſincerely declare, that when I publiſhed my book, my chief aim was, faithfully to relate all the truths I had diſcover'd, and not to offend Signor *Redi*, whom I exceedingly eſteem and honour for his rare Talents, and whoſe friendſhip I hope to have a ſhare in; ſo far was I from pretending to do any thing that might make him write againſt my Book, or from fore-ſeeing that ever I ſhould have occaſion to labour to defend my ſelf againſt him: Which yet I ſince found otherwiſe, by the Letter he hath written

ten

ten againſt me, and even without honoring me with a Copy of it, wherewith he hath gratified many perſons at *Paris* and elſewhere, even after I had had the advantage of ſome Letterary Commerce with him, as I might eaſily juſtifie.

I can beſides proteſt, that when I reſolved to contradict certain points of his firſt Letter, it was in a manner againſt my will, and becauſe I could not at all diſpenſe with it, except I would have baffled my ſenſes, and that light I ſaw my ſelf, together with a great number of witneſſes. I can alſo aſſure, that I ſhould now be very ready to un-ſay what I have affirm'd upon this ſubject, and to agree with him, if I were not altogether perſwaded of the contrary in the main things he hath written againſt my Sentiments.

After theſe Proteſtations, being well aſſured as well by Reaſon, as by many new Experiments newly made, that I have aſſerted nothing but what is true; I found my ſelf indiſpenſably obliged to maintain it, and to render a good office to the publick, by endeavouring to ſhew that 'tis very difficult reaſonably to oppoſe any thing to the contrary.

The difference between Signor *Redi* and me conſiſts chiefly in this, That he Pretends, the Jellow Liquor contain'd in the Veſicles

of

of the Gums of Vipers, to be the only and true ſeat of their Poiſon; That this juyce is not venomous when taken at the mouth, but that it is ſo when let into the wounds made by a Viper whilſt ſhe is alive, and even in thoſe, which ſhe may be forced to make ſeveral days after ſhe is dead, provided that yellow liquor do intervene; That the ſame liquor drawn from a live Viper, as well as that of a dead one, is always venomous if let into wounds, and mingled with the blood of the Animal wounded, whether it be uſed when liquid, or after it is dryed and reduced to powder; and that it generally kills all kind of Animals into the wounds of which it ſhall have been intromitted.

But I, who of all theſe points can admit of none but that of the innocence of the yellow liquor when taken at the mouth, and oppoſing my ſelf to all the reſt; do ſay, That the Poiſon of a Viper is no where but in her enraged Spirits; that the yellow juyce as well of a live Viper, and even a vexed one, as of one that is either newly dead, or hath been ſo for ſeveral days, contains in it no poiſon at all, neither in the biting, nor taken inwardly, nor put into wounds, not mingled with the blood, nor any other way wherein it may be uſed; that it kills nor infects any kind of animals

mals; and that it is nothing but a meer and innocent *Saliva*.

The queſtion muſt principally be decided by matter of Fact; though it may alſo be cleared by very pertinent reaſons. I am far from accuſing Signor *Redi* of unfaithfulneſs in his Experiments; though they were not made in publick as mine, and that ſome thing might be ſaid as to the formalities of the biting, and the uſing of the yellow liquor: His reputation is too well grounded to be blamed; and this is the conſideration which troubles me moſt. Mean time I ſee the contrary to what he hath advanced againſt my Book; and the truths which I there oppoſe are ſo clearly ſeen in my Experiments firſt and laſt, as well in thoſe I have made only in the preſence of ſome curious perſons, as in thoſe I have lately made in publick, and before a great number of Phyſitians and other perſons very Intelligent in theſe matters. So that I can nor ought any longer to hide thoſe truths, which are the chief inducement of writing this diſcourſe.

We need not wonder that Signor *Redi*, having made all his Experiments by order and at the expence of ſo great a Prince, who is as curious as he is Munificent, had Vipers and all ſorts of Animals in far greater number than

I had; I, who did all from my ſelf, at my own charges, and with a meer deſire to diſcern truth from falſhood. Nor do I think, I was obliged to multiply expences when the truth was found ſufficiently clear'd up, and all the by-ſtanders acknowledged, that I had made ſufficient tryals for every Experiment. For ſince he hath contented himſelf with having made ſome of the yellow liquor to be ſwallowed by one only Man, one only Duck, one only Kid, thence to know and to aſſure himſelf of its innocence when ſwallow'd, without making a greater number of Experiments; He muſt not blame me for having candidly bounded my curioſity, after I had in divers things made many more Experiments, then he mentions he hath made upon this ſubject; as appears by what he writeth *p.* 17, & 18. of his firſt Letter. I find therefore, that he hath no great cauſe to complain of me (as he doth, under the name of *thoſe Illuſtrious Authors*, to whom he aſcribes my Book in his Letter) for not having vouchſafed to make Experiments enow to confirm the truth of the Obſervations about Vipers, contain'd in his firſt Letter of 1664. He had not, I ſay, great cauſe to ſpeak of it after ſuch a manner, ſince I did do ſo but in imitation of him, and becauſe he had in the ſame Letter advanced and aſſured par-

particulars, which required not I ſhould make more tryals then thoſe I have deſcribed in my Book: Although I can aſſure to have made more then I have recited. He knows very well, that about the end of pag. 23. of his firſt Letter he uſed theſe words.

E quel veleno ſhizza tutto fuora, ſe non al primo, almeno al ſecondo morſo; ſi che il terzo (e più volte l'ho eſperimentato) non è veleneſo: That is, *And that poiſon iſſues all out, if not at the firſt, at leaſt at the ſecond biting; ſo that the third* (which I have often experimented) *is not venomous.*

And if, becauſe of the reſpect I bear to the writings of a perſon of ſo high a reputation, I thought among divers other Experiments, that having made one and the ſame Viper, every time vexed, to bite five ſeveral Pigeons, which all died, and even the laſt of them ſooner then the reſt, I might ſtop there; I think Signor *Redi* hath nothing to reproach me with. He had aſſured in his firſt Letter, and aſſures the ſame in his latter, That all the poiſon did lodge in the yellow liquor, and that this poiſon was all exhauſted if not at the firſt, yet at leaſt at the ſecond biting, and that he had often experimented that the third was no more venomous: So that, if I was perſwaded, that all the yellow Liquor muſt be come

come out by the ſecond bit ing made upon the ſecond Pigeon, and if, after that, I have ſeen dye three other Pigeons by the freſh bitings of the ſame Viper that had bitten the two firſt; I do not think that Sign. *Redi* hath right to accuſe me for not having done enough: He might rather have done me that juſtice as to acknowledge, that I had done more then enough to maintain my Reflexions, and that I was obliged from that time to ſeek the poiſon elſewhere then in the yellow liquor, in regard it did no longer intervene, according to him, in the three laſt bitings, and that the three laſt Pigeons were as ſoon, yea ſooner, dead then the two firſt, of the death of which he could charge the yellow liquor. If I could not find, no more then Sign. *Redi*, in all the body of the Viper, any other viſible or palpable part that was venomous, and that might juſtly be declared to be the ſeat of the poiſon, and the true cauſe of the death which enſued upon the three laſt bitings; he muſt not wonder, if I have ſought and found it in the *vexed Spirits*, and if I have grounded my ſelf upon the beſt evidence, I could get from Experiments and Reaſon.

But ſince the chief motive of my tryals hath been the deſire of exactly knowing the Truth concerning thoſe matters; having ſeen that

Sign.

Sign. *Redi*, *pag.* 31. of his laſt Letter hath deſired I would make new experiments after his Objections againſt me: To be the more aſſured of all, I have been willing to give him that ſatisfaction, in giving it to my ſelf. For, in the moneth of *May* laſt, in the Chymical Laboratory of the Royal Garden, in the preſence of two or three hundred by-ſtanders, both Phyſitians and others, capable to judge of it, and worthy to be credited; from amongſt many live Vipers, ſent me out of *Dauphiné*, and divers parts of *Poitou*, I choſe a great Femal-Viper, that was luſty enough notwithſtanding the great way ſhe came, and having open'd her jawes, I very carefully cleared and ſqueezed out of them at ſeveral repetitions, all the yellow liquor contained in the bags of her gums, and that alſo which might be diffuſed about the neighbouring parts, with a fine piece of linnen cloth wound about the handle of a pen knife: Which done, I took the ſame Viper with Pincers about her neck, and angred her in making her to faſten her teeth into the end of her tail, and in preſſing from time to time her neck with thoſe Pincers; and immediately after I preſented to her five Pigeons and two Pullets one after another, to bite them in the moſt fleſhy part of their Cheſt, having irritated her every time

of

of her biting. I purpoſely wounded alſo ſix Pigeons and Pullets in divers places, in the preſence of all the company, and let into the wounds ſome drops of the yellow liquor, drawn from the Veſicles of newly enraged Vipers. I laid both ſorts a part; and the company parted about an hour after, before which time, five of the Pigeons and Pullets, that had been bitten, were dead, and the two remaining died about an hour after; but the Pigeons and Pullets, which I had wounded, and in whoſe wounds I had put in ſome of the ſaid juyce, ailed nothing, but that there appeared ſome lividneſs at the place wounded, and ſuch an one as might have been there from the ſole wounding them, and without any concurrence of that liquor. Two days after, I ſhew'd the company the ſame wounded Pullets and the ſame Pigeons, which were very well, and had their wounds almoſt perfectly healed up, only there remain'd a little blewneſs about the wounded parts. I would then have wounded the ſame animals again in other places, and intromitted freſh yellow liquor: ſome alſo of the by-ſtanders propoſed to let into one of theſe creatures ſome of this yellow liquor by that way of Transfuſion, that hath lately been made in divers parts of *Europe*, of ſome ſtranger blood into

into the veins of men, that ſo this juyce being mingled with the blood by the ordinary circulation, it might be able to diſcover what ever it could do. I readily complied with their motion, whereupon the intromiſſion of this liquor was attempted upon one of the ſame Pigeons that had been wounded two days before. One Phyſitian and two Chirurgions did the work one after onother, in making both the inciſion and the ligature of the moſt diſcernable veſſels of the right wing: But they let the Pigeon looſe ſo much blood, that it dyed ſoon after. Seeing this, I ſaid, that the Pigeon dyed only from the loſs of its blood, and not from the letting in of the yellow liquor; and that it would be neceſſary, one only Chirurgion of the Company ſhou'd make a new operation upon another of the ſame Animals, that had been wounded 2 days before, and upon whom that yellow Juyce had alſo been tryed. The Operation was made accordingly at the ſame time upon a Pullet, which did not only eſcape again, but was ſeen the next day and the following days by the whole company to be very well; as were alſo the other anima's that had been wounded again at the ſame time, and received of the yellow liquor, though without the way of transfuſion. Yet true it is, that one of the

Pigeons, that had been the ſecond time wounded, was found dead ſome time after its being wounded, in a cloſe earthen Furnace, very hot, and ſtanding cloſe by ſuch another, where I then diſtilled ſome ſpirit and oyl of Tobacco, and the death of which ought to be imputed to the piercing vapors of this diſtillation, or to the exceſſive heat of the Furnace in which it had been ſhut up, which was found ſo hot, that the heat of it could not be endured by ones hand; beſides that being cloſed, almoſt no air could enter.

Which being thus paſſed, yet foraſmuch as the reputation of Sign. *Redi* had acquired him much eſteem and favour from many perſons in *Paris*, I perceived ſome of the company yet inclined to doubt, whether this yellow Juyce were always innocent. Whereupon, having by me 4 Dogs of different bigneſs, I preſs'd thoſe that ſeemed moſt to doubt, that they would transfuſe or cauſe to be transfuſed ſome of that reputed poiſonous liquor into all thoſe Dogs, or at leaſt into one or other of them; but how inſtant ſoever I was, no body would undertake it. It was alledged, that thoſe Animals were too Robuſt to Succumb under ſuch an operation, ſince the Pullet, that had endur'd it, and twice felt the yellow liquor, had eſcaped as well as the

other

other Animals, that had been wounded again at the ſame time with it, and that had alſo received into them ſome of that liquor. Which obliged me to proteſt, it was not my fault that it was not experimented a freſh, and to pray the company to take the refuſal of thoſe perſons for an acknowledgment of the innocence of the yellow liquor.

But not being ſatisfied herewith, I referred the matter to the next day, and promiſed to have ready new Animals, of a leſſer ſize than thoſe Dogs; the more amply to verifie the innoxiouſneſs of that Juyce by new intromiſſions thereof into wounds.

I had then prepar'd ſix Pigeons, and two Catlings; and engaged a perſon whom I knew moſt favourable to Signor *Redi*, to make himſelf the inciſion, and intromit the yellow liquor as he ſhould think beſt. He made ſuch wounds as he pleaſed, and he did even ſever the skin of the fleſh round about the wounds he had made, and ſo far, that I could not hold to tell him ſmiling, he did more than Signor *Redi* himſelf ſaid in his Letters he had done; and added, *Boni eſſe paſtoris tondere, non de glubere*, A good Shepherd did Sheer, not Flea his Sheep.

One of the Catlings was bitten in the Cartilagineous part of the Ear, without any ap-

pearance of blood at the place of the biting; and it eſcaped. The other, which was much leſs, and a very noted one by the blackneſs of its colour and by having her ears cut off, was purpoſely wounded on the upper part of her neck behind, and alſo at the lower bone of the hinder part of the head; its skin alſo was ſeparated from the fleſh round about the wound, and on both ſides, almoſt as far as to the fore part of the neck: And then as much of the yellow liquor as they would was put into both ſides as well as into the wound. This Cat held down her head, by reaſon doubtleſs of the pain ſhe endured by having in a manner been flead alive; feeling alſo ſome pain in two other places, where ſhe had been wounded and flead. Some of the by-ſtanders began already to mutter, and ſaid, I ſhould be caſt, and the Cat would certainly dye; yet notwithſtanding the Cat did not dye, though ſhe was very little and taken out from under her dam; and ſhe was ſhew'd to the company 24 hours after, ſound and ſafe, although ſhe had neither ſuck'd nor eaten any thing all that time. And 'tis remarkable enough, that this very Cat, having been returned to a Fryar to whom ſhe belonged, and being grown big, hath yet to this day the hind-part of her skull uncloſed at the place of her wound;

and

and notwithſtanding all that, & the falling off of ſome fleſh and skin, that were ſever'd from the places where ſhe was flead, ſhe is very lively and full of play, and very divertiſing mimick geſtures.

The ſix latter Pigeons, that had been wounded at the ſame time, and received of the yellow liquor, were likewiſe produced; and they were yet kept five or ſix days with the other Pigeons and Pullets that had been twice wounded before; among which was that alſo on which the transfuſion had been imitated. At laſt they were killed, roſted, and eaten, in good company, of which were ſome of thoſe that ſaw them wounded; and that found them very good and ſavoury meat.

Amidſt all thoſe Experiments I omitted not to try, whether the heads of Vipers newly dead, having yet their necks on, with all their yellow liquor, would be able to kill Animals, by making them to be bitten by them. I tryed it upon Pigeons and Pullets, by thruſting the teeth into them as deep as I could. I employed alſo to the ſame purpoſe ſome whole Vipers, which I had found dead among the live ones in the barrils, and which abounded in the yellow liquor. But this was always without any inconvenience to the Animals bitten, ſo far was it from killing them.

I here pass by many other Experiments made at my house, in the presence of several Physitians, that did all agree in making out the innocence of the yellow liquor, and in ascribing the poisonousness to the enraged spirits.

Yet I must not leave here un-mentioned, what was done by three young Physitians, who being perswaded of the truth of my Experiments, as well concerning the innocence of the yellow liquor, as that of bitings made without the angred spirits, caused their fingers to be bitten, to strifes, by a dead Viper having yet all her yellow liquor, and that so deep, that the blood of it appeared to all: But they found no other inconvenience by it, but what they might have felt from prickings made by a needle.

I had certainly made a far greater number of Experiments if I had not observed, that Sign. *Redi* himself had already made many for me, and for the maintaining of my Sentiments; and among others that of *pag.* 26. of his first Letter of Observations, where he saith,

Si mori un pollastro morsicato, &c. That is, *There dyed a Pullet bitten by a Viper, the points of whose teeth I had cut off; and out of whose vessicles I had squeezed out all that ill juyce that is there.*

For

For, ſince by his own confeſſion, there dyed a Pullet by having been bitten by a Viper, the points of whoſe teeth he had deſignedly cut off, and all whoſe yellow liquor (which he calls the ill juyce, and will have to be the only ſeat of the poiſon) he had carefully preſs'd out of the veſicles of her Gums; He hath no more ground then I, to charge the death of the Pullet upon a liquor, which was there no more, nor upon the points of the teeth, which he had cut off. And he cannot avoid to accuſe with me the vexed ſpirits of the Viper, and to fall into my opinion, *viz*, That the venom of the Viper is not a groſs matter, but ſomething inviſible and ſpiritual.

And to ſhew again, that Signor *Redi* hath laboured, without being aware of it, to juſtifie my Sentiment, and that at the ſame time he manifeſtly contradicts himſelf, by deſtroying in his laſt Letter his firſt Propoſitions, which is, *That all the venom of the Viper iſſues at the firſt, or at leaſt at the ſecond biting, and that the third is venomous no more*, as he aſſureth to have often experimented; to ſhew that, I ſay, I ſhall alledge the words of pag. 33, 34, and 35. of his laſt Letter, *viz.*

Su'l principio di maggio ſcelſi una vipera, &c. That is, *About the beginning of* May *I choſe a Femal-Viper, one of the biggeſt and luſtieſt, and*

vexed her to bite ten Chickens, one after another, in the right thigh; of which the first, second and third died almost in an instant; the fourth seem'd only to be sick; but the fifth and all the rest did not only not dye, but were not at all sick; and yet every time the Viper did bite, I angred and madded her exceedingly. In the moneth of June *I repeated the Experiment in five tame Ducks, bitten by one and the same Viper, which also immediately after bit three young Turtle-Doves. The first wounded dyed three hours after; the second five hours after; the rest escaped. 'Tis true, that the first mention'd of the Turtles dyed, but not the other two. Of twelve Ring-Doves at one time there dyed but four; but the next day of twelve others there dyed six. Of five Rabbets there dyed three; and of three Lambs the two last dyed; the first of them dying two hours after it had been biten.*

These several Experiments directly contrary to the first assertion of Signor *Redi*, were capable to perplex any other head but his. For first, he hath seen, that of ten Pullets bitten one after another by one only Viper, the three first dyed suddenly, and the fourth was somewhat sick; He hath seen, that of five Ducks and of three Pigeons, bitten one after another by a single Viper, the two first Ducks dyed, as also one of the Pigeons, which had

had been bitten even after the five Ducks: He alſo ſaw once, that of twelve Pigeons bitten, four dyed; that another time of twelve there eſcaped but the moiety; and that of five Rabbets, likewiſe bitten, there were but two that evaded dying.

I cannot but be amazed, that all theſe Experiments have not been able to change his opinion, or at leaſt to ſuſpend it. Nor do I doubt but that the number of Animals that dyed would have been much greater, if the bitings had been made in other places but the legs. For, beſides that they have their bones, nerves, and tendons, that are able to blunt the point of the teeth at the firſt biting; they have alſo their Muſcles, which are very viſcous, and therefore fail not to imbue the teeth of the biting Viper, thereby ſtopping in part their Pores, and even hindring them by that viſcoſity from entring far in the enſuing bites, and I likewiſe doubt not, but that will come to paſs more and more in the reiteration of their bitings. Nor do I wonder, that the Ducks did not dye ſo ſoon as the Pullets or Pigeons, nor that there dyed leſs of them; for, beſides the reaſons juſt now alledged, they have their skin, bones, and all parts much harder, and far more difficult to be pierced by the Vipers teeth, than thoſe of Pigeons or

Pullets.

Pullets. Now I do not find any part more proper to try divers bitings, then the fleshy part of the chest, which hath neither Nerves, nor Tendons, nor bones near, nor that Viscosity found in the Muscles of the legs.

Mean time these Experiments made by Sign. *Redi* himself, must oblige him, as far as I can judge, to relinquish his first Assertion: And if he will persist to maintain, that the yellow liquor is the true seat of the poison, he must needs believe that liquor to be inexhaustible, and that always there succeeds some fresh, in all the bitings of a Viper; or, if he will abandon his opinion, and ascribe the poison no more to the yellow liquor, he must find out some other subject to assign it to, except he please to take mine, and to lodge it in the irritated spirits; in regard that he cannot find it in the yellow liquor, which is no more there, after the second biting (as himself assureth;) and which must yet more evidently be wanting there, when designedly he had with care taken it out of the bags of the gums of the Viper that bit the Pullet, and the bite of which was followed by the death of the Animal bitten.

But if Sign. *Redi* should now be in an humor to alter his opinion, and to judge the yellow liquor to be necessary in all the bitings of a Viper

Viper (though that be an impoſſible thing;) his opinion would never be received by diſintereſſed perſons, that have ſeen my firſt and laſt Experiments; among which perſons there are ſome, even of the moſt able, who, having heretofore examin'd the *Salival Glanduls* upon the deſcription I gave them of it after I had diſcover'd them, did there obſerve alſo ſome ſmall *Lymphatic* Veſſels, more numerous then thoſe that had firſt appeared to me; and who, having ſeen the laſt Letter of Sign. *Redi*, were willing to ſuſpend their Judgment until the making of my new Tryals, which have altogether confirm'd them in my firſt opinion.

For, not to ſpeak of this, that in the preſence of divers perſons, even of the beſt quality, at ſeveral times and places, in divers aſſemblies, & even in the Conferences of the Abbot *Bourdelot*; I have ſwallow'd ſome of the yellow liquor taken out of the bags of the gums of many live and enraged Vipers, without finding the leaſt inconvenience from it, no more then the Viper-catcher of Sign. *Redi*: I can boldly aſſure all the world, that at no time, in no place, there ever dyed any animal of all thoſe I have wounded, or ſeen wounded on purpoſe, and into the wounds of which that liquor hath been intromitted, although it had been drawn hot out of the Veſicles of

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the gums of Vipers exceedingly vexed; so far is it, that the Juyce of dead Vipers was able to annoy any animal. I can also assure, that never any head of a dead Viper, whether the Animal were whole, or that head only with its neck, and though it abounded with that yellow liquor, hath done any harm to man or any other Animal, bitten by it.

The yellow liquor, which I swallow'd in one of the conferences of the Abbot *Bourdelot*, puts me in mind of a Letter, which M. *Des Tapieres*, a very curious, sincere and able Apothecary of *Bourbon l' Archamband*, had written to him, which was there read, and among other things did relate, That in the year 1630. he had taken a Viper, whose crook'd teeth he had cut, and that he carried her in his bosom; and that after two or three days, a fancy taking him to approach her to his face, pressing her a little, she bit him in his lip, and thereby caused great pain to him; whereupon he flung her to the ground and in his anger crusht her in pieces; that his lip and face swelled; that a Ligature was made upon him; that Treacle was given him, and some of it applied to the bite; that at the place of the wound there appear'd a little bladder, whence issued two or three drops of liquor of a dark yellow colour, and that his

his face remain'd very pale for a moneth.

If my opinion be asked about this Experiment, I declare that there is nothing in it, which I ought not to believe; and I add alſo, that there hapn'd nothing in it, which agrees not with the principles by me eſtabliſh'd and maintain'd. For, although the great teeth of that Viper had been cut, which might have gone further, and mingled the enraged ſpirits of the Viper with the blood of M. *Tapieres*; yet they had not cut the point of the ſmall teeth, which I ſhew'd in the ſame conference together with the other neighbouring parts in the teath of a live Viper, ſent to Monſieur *Bourdelot* by the ſame Apothecary that had been bitten: of which ſmall teeth I have heretofore given the deſcription and figure, as well as that of the upper and lower Jawes, in which they are faſtn'd, as may be ſeen in ~~my~~ *Anatomy of Vipers*, in the *Section* of the teeth, and the third *Cut* of that Book. For, although thoſe little teeth have not the length nor thickneſs of the great ones; yet they have the ſame ſhape and the ſame matter; for they are bony, crooked, tranſparent, and very ſharp; ſo that the vexed ſpirits may paſs into them as into ſmall Funnels, and through their Pores, as they do through thoſe of the bigger ones: But they cannot go very deep,

becauſe

becauſe their ſmalneſs permits them not to carry their openings as far as into the fleſh; and all they can doe, is, to open the skin. Now to reaſon upon the accidents that befell M. *Des Trapieres* by this bite, as they are ſet down in his Letter; I ſee nothing in them that is not very natural, and very credible. For, although the angred Spirits had entred by the openings made by the ſmall teeth; yet they could not penetrate the fleſh, nor mingle with the blood, becauſe thoſe apertures were not deep enough, and they could do no more but to make their effort 'twixt the fleſh and skin; whence follow'd the ſwelling of the lip and face, and the impreſſion of the pale colour, which appear'd there during a moneth; which accidents might at firſt have been eaſily prevented by one only doſe of the volatil Salt of Vipers, which would have made the enraged Spirits to tranſpire, that lodged between the fleſh and the skin, and could find no entry to paſs further. As to the little bladder, which was formed at the place of the bite, and the two or three drops of dark liquor that iſſued afterwards, that was nothing but a little ſerous moiſture that had been gather'd there from the neighbouring parts, and that had been cauſed by the compreſſion of the Ligature,

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and by the bruiſing made by the teeth and Jawes at the time of the biting, and without any intervention of the yellow liquor, which beſides its innocence, could not have entred through ſuch ſmall apertures.

After ſo many Experiments, and upon ſo many Reflexions which I have made, as well on the yellow liquor, as on the irritated ſpirits of Vipers, I cannot comprehend, how the Animals of Sign. *Redi* could dye all and without any exception by the intromiſſion of the yellow liquor into the wounds, he had made in them, and by the biting of heads ſever'd, or by that of entire Vipers that had been dead ſeveral days. I have too many experiments to the contrary, and too many witneſſes, to put it out of doubt, and to fix me in my firſt opinion.

But, to the end that among the Truths by me advanced, and conſiſting in matter of fact, the publick may find wherewith to be ſatisfied; I thought my ſelf obliged to explain my ſenſe upon theſe matters, and to form to my ſelf the Objections, that may be made againſt me.

I ſay therefore concerning the *Yellow Liquor*, That nothing can act from it ſelf, but according to its nature, the diſpoſition of the matter of which it is compoſed, and the force

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of its activity. For example, you will not find in River Water, the taſte, ſtrength, nor particles that are found in Wine, nor will *that* inebriate like *this*: it hath not the acrimony nor penetrancy of Urine, neither the colour not bitterneſs of Gall: The Spirit of Wine, that is freed from the aqueous parts, which hindred the Wine from producing the effects it was capable of, is much more ſubtile and ſtrong, then the ſame wine whence it hath been drawn: The Volatil Salt of Wine hath quite another penetrating force than the Urine which contained it before its ſublimation: And not to go from my ſubject; the volatil Salt of Vipers is very different from the fleſh and bones of them, whence it hath been extracted; and, though in ſmall quantity, it will work more in a moment as well by its odour as its piercing vertue, than ten times as much of that matter, whence it hath been drawn, could effect in many hours: The bileous, ſharp, ſalt and ſpirituous ſeroſity, that is often form'd in our bodies, will ſuddenly produce inflammations in the eyes, tumors in the cheeks, gums, throat, and many other parts, as alſo Puſtuls, St. Anthony fire, and the Gangrene it ſelf; and all that it does by the compoſition of its parts, and the force of its activity; whereas the thick and viſcous

Phlegme

Phlegme will do no ſuch thing, but chargeth nature only by its weight, cold, and tenacity: This Phlegme, I ſay, will ever be incapable of working with quickneſs, and it cannot produce any effect but very ſlowly, and in proportion to its power, which is extreamly confined.

So then, it is not the nature of the yellow liquor, to paſs ſwiftly to remote parts, and there to act with vigor and violence; which is obſerved in the poiſon of a Viper. I ſay, that a tough, viſcous, and in a manner inſipid *Saliva*, cannot make any great progreſs in a moment. I affirm beſides, that 'tis impoſſible, it ſhould corporally enter into the holes made by the teeth, which are very ſmall and almoſt inviſible, and that it ſhould alſo paſs through the cavities of the teeth, and much leſs through their Pores, if any would have them paſs that way. I ſay further, *that* although the teeth of a Viper ſhould be all over imbued with that Juyce at the time of her biting; the skin of the Animal bitten, and the fleſh it ſelf, if need were, would keep it out of the bitten place, and hinder it from entring there; *That* though it ſhould be able to enter, it muſt have a fit place to receive it, a great paſſage to go through, and a long time to arrive to the parts

remote; I ſay alſo, that though it were arrived there, (if that were poſſible,) it could never act beyond the forces, which nature hath reſtrained it to.

Beſides, if this yellow liquor were capable of any conſiderable operation, it would not fail to diſcover it either in whole or in part, when 'tis ſwallow'd and got into the ſtomach; where the place, the heat, and all things would ſeem to concur *either* to make it ferment, if its matter were diſpoſed for it, *or* to reduce its power into action: For, by paſſing out of the ſtomach into the inteſtins it would infect the Chyle, and make of it a poiſon, which would be carried jointly with it through the milky veſſels, and through the Thoracique Ductus's, ſo happily diſcover'd by the illuſtrious M. *Pecquet*, to deſcend into the Heart with the blood, the which is the matter, on which the poiſon of Vipers does ſo particularly exert its dominion. And this way is much more eaſie and large, than that of the opening, made by the teeth, by which this juyce cannot ſo much as enter. I ſay this further, that, if it were ſuch as Sign. *Redi* makes it to be, it would, being taken at the mouth and let down into the ſtomach, impreſs upon the places of its paſſage, and thoſe of its ſtay, ſome mark or other of its power, eſpeci-

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ally if it did contain any *Arſenical* Salts, which would not fail, ſoon to manifeſt themſelves either by their taſte or by ſome other effects: And yet all thoſe that ſhall taſte or ſwallow this yellow liquor, ſhall never perceive any malignity whether great or ſmall, neither in the mouth, nor in the ſtomach, nor elſewhere. I conclude therefore from all theſe conſiderations, that this juyce contains in it no part at all, that is able to diſſolve, or coagulate, or diſcompoſe any part of our body; & that it hath not any quality, manifeſt or occult, to ſhew that 'tis capable of doing ſo.

I add moreover, that this juyce, as flat and ſalivous as it is, is always found ſo yellow in all parts of *France*, that it can hardly be leſs colour'd than 'tis in *Italy*; and that they both muſt have altogether alike qualities, or, at leaſt, very near ſuch. And it would be to no purpoſe, to alledge in favour of Sign. *Redi*, that the diverſity of places and climats, or that of aliments might be able to change the nature of Vipers, and cauſe that manifeſt difference, there is between his Experiments and mine. For, although ſome diverſity may be obſerved in other things, there can be found none in this; and if there could be ſome difference, it cannot be that the nature of the yellow juyce, and that of the Spirits ſhould

be *quite* changed; ſince we find in *France* the ſame marks in that liquor, which Sign. *Redi* hath found and deſcribed in that of *Italy*, and ſince our Vipers, without any intervention of that juyce, do kill as nimbly as his can do.

But I think it would be much, if in the yellow liquor, or in the enraged ſpirits, there could be obſerv'd any *ſmall* degree of quality, ſtronger or weaker in *Italy* than in *France*. For, I have by a great number of experiments made it out, that all the Vipers of *France*, though taken in very different places, and often ſuch as are ſix ſcore Leagues diſtant from one another, have their poiſon altogether alike, and do kill equally. Whence I inferr, that the difference of the Vipers of *Italy* and *France*, cannot be conſiderable; ſince *Dauphiné*, which is a Province in *France* that furniſheth us with many of them, and is very mountainous as well as *Italy*, borders upon *Piemont*, which is the beginning of *Italy*; and that the ſame *Dauphiné* abounds in Vipers in its utmoſt extremity; and ſince alſo all Vipers, we get from thence, have their yellow liquor always very innocent, though high colour'd. And I can truly ſay, that thoſe Vipers, that have ſerv'd me moſt both in my firſt and laſt experiments, were moſt of them ſent me out of *Dauphiné*, and that I was willing

ling to make uſe of ſuch, as being commonly bigger than moſt of thoſe that were ſent me out of *Poictou* ; that, at leaſt, which ſerv'd me to bite the five firſt Pigeons, which I ſpake of in my firſt Experiments ; and that which bit the ſeaven laſt Pullets and Pigeons, were of thoſe of *Dauphiné*, and even of the bigger ſort that could be procured.

And it would have been to no purpoſe to have uſed any tooth of a Viper ſever'd from the head, and much leſs to wipe it dry with ſome bread crums, in hopes it ſhould kill any Animal by pricking it therewith ; ſeeing the teeth, that had of the yellow liquor upon them, without being ſeparated from the dead heads, were not able to do any harm, no not thoſe of live ones, without the concurrence of the enraged ſpirits. And if ſometimes I have made uſe of bread-crums, ſometimes of a fine linnen ragg, to wipe away all the yellow liquor of the veſicles, that was never but in live Vipers ; to ſhew, that it was not that liquor which did kill, but the vexed Spirits only, entring by means of the biting.

We are not to imagine neither, that a Viper teareth by biting, unleſs having made her to thruſt her teeth into the fleſh of ſome animal, you do immediately after draw her away by the reſt of her body : We are not, I

ſay, to pretend, that a Viper doth, by biting of her own accord, make any great opening, at which the yellow liquor is able to enter. For, ſhe doth no more but thruſt in her teeth far enough, and preſently draw them out again, with as much eaſe as a Cat draws out his claws when he will. Beſides, you cannot perceive but two very little holes, which do alſo ſeem as 'twere cloſed again by the fleſh, and which would hardly be diſcern'd, if the pain of the bite, or the accidents enſuing, did not oblige us to look very narrowly to it.

We alſo never ſee, that the poiſon faſtens it ſelf to the part bitten, nor that the evil begins by a mortification, or by a gangrene there. For, if that were ſo, and if the venom did lodge at the entry, it would be much more eaſie to maſter it. I know alſo by many Experiments, that the poiſon never ſtays at the place where it enters, but inſinuates it ſelf very nimbly into the Veines, to mingle with the blood; eſpecially if the bite hath open'd for it a paſſage free enough, to arrive there. I know, that there it produces afterwards thoſe troubleſome accidents, which enſue upon the biting; and that laſtly it cauſeth death, if it be not prevented by a quick relief. Which clearly ſhews, that a poiſon of this nature muſt needs have diſpoſitions to pene-

penetrate, very differing from thoſe that appear in a yellow liquor, that is incapable of all ſudden motion and operation.

It would alſo prove an uſeleſs labour, to ſuck at the place of the biting, in hopes of getting out from thence a Juyce, which could not enter there. And though I do not diſprove this way of ſuccours on ſuch occaſion; yet I know, that all what the ſucking can do, is, to fetch out again part of the enraged ſpirits, that had enter'd by the openings of the bite. I know alſo, that a ſpecifique remedy, taken at the mouth, is far better.

It would be in vain, to object unto me the example of the ſeed of Animals, which, notwithſtanding its viſcoſity, ſerves daily to propagate that *Species* which produces it; and that it could in like manner come to paſs in the yellow liquor to convey the venom in the biting. For beſides that the ſeed is the pureſt and moſt elaborat part which an animal can produce; it is alſo accompanied with ſtore of Spirits; and there needs, beſides, the concurrence of many other means as well to introduce and to receive it, as to form and perfect the *Fœtus*: There is moreover neceſſary an aſſiſtance of abundance of ſpirits from the mothers ſide; a juyce proportionate and proper for its nouriſhment and

increaſe, and a ſufficient time for the ſame. Whereas the yellow liquor, *that* can paſs for nothing but a juyce excreted out of the Salival Glanduls, after it had been ſent thither from the brain and the neighbouring parts, and *that* is deſtitute of ſpirits and of all diſpoſition to act; wants alſo a paſſage ſufficient to intromit it, and a place proper to lodge in. And if you ſhould grant it an entry, and a place to ſojourn in; it muſt have a much longer time than the ſeed, of which I was ſpeaking. But with all this time and all the other circumſtances, it would ſtill be incapable of working any thing at all perfect, and periſh of it ſelf; without any remarkable production.

If any ſhould ſay, That this yellow liquor may have ſpirits proper and proportionate to its nature, and that they are not wanting to make the poiſon work at the moment of the biting; but that, being drawn out of the veſicles, and expoſed to the Air, thoſe ſpirits are diſſipated, and thereby render it incapable of all action: I anſwer, That, without ſtaying upon what I have amply made out of its innocence in all kind of uſes, Signor *Redi* himſelf contradicts it, as I have mentioned above; ſince he pretends, that the Juyce even of ſuch Vipers as have been dead for ſeveral days, &

that

that is dryed to boot, ceaſeth not to inſinuate its venom without any intervention of ſpirits, when it is put into wounds. But, beſides all that, many Experiments have evinced to me, that death follows the biting without any intervention of the yellow liquor, and then when it hath been perfectly wiped away. Moreover, it is well known, that 'tis the nature of ſpirits, to be in motion, to faſten themſelves to, and to follow the parts that have moſt of them, as for example, the blood. It is alſo to be noted, that the ſpirits, that do inſinuate the poiſon, are not of the nature of thoſe that follow the ordinary motion of the blood of the animal; *that* they do not joyn themſelves to it, as thoſe; and *that* neither of them have any union with the yellow liquor; which is but a meer excrement: But that the *Spirits*, I ſpeak of, do form themſelves in the moment that the Viper conceives the *Idea* of revenging her ſelf; and they need not the embaraſment of ſuch a dull and viſcous juyce, which is not qualified to follow them, nor to paſs through the imperceptible pores of the teeth, which the ſpirits only can penetrate, no more then they can any ways enter through the holes, which the teeth have made. In a word; the nature of a groſs, tough and viſcous juyce is not, to act, penetrate, and be

ſwift-

wiftly carried to the moſt remote parts of the body; but that belongs to ſpirituous ſubſtances, to go and come where groſs corporall ones cannot. Theſe are the only ſpirits, that can ſubvert the whole Oeconomy of the body; they are they, that diſturb the circulation of the blood, and that corrupt it; they are they, that ſtop the natural and animal ſpirits, and hinder them from paſſing to the parts of the body as they were wont to do; and laſtly, 'tis by the let of them, that the death of the Animal uſually enſueth the biting.

As to what may be objected, that 'tis very difficult, ſo exactly to evacuate the yellow liquor, that there remain none at all; and that it may very well come to paſs, that a little of it intervenes in all bitings: I anſwer, that beſides that this is alſo againſt the opinion of Sign. *Redi*, and which he hath renounced in his firſt Aſſertion; the Salival Glanduls, though many in number, yet are too ſmall and have too little capacity to contain juyce enough to furniſh for that purpoſe; and that that cannot be expected but from great animals, that have thoſe Salival glanduls and the other parts far bigger: And though it were poſſible, they ſhould ſufficiently furniſh, I do maintain, that the impoſſibility of intromitting that juyce, and its evinced innocence,

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ought to ſuffice for confuting this Objection.

Yet this I ſhall here ſay in favour of Sign. *Redi*, That I doubt not but that this yellow liquor, as Salivous and Excrementitious as it is, contains its Volatil Salt, as well as all the other parts of a Viper, and all the parts of Animals, and even all their excrements, and that conſequently it is to be reputed ſpirituous. But then, beſides that theſe ſpirituous ſubſtances are never hurtful, they are yet too intimately mixed and locked in with their matter, and they cannot produce their effects without being ſeparated from it; which cannot be but by a violent heat, and in veſſels fit for it. I ſay therefore, that by art there may be extracted a true Volatil Salt out of this yellow liquor, & even without any addition or mixture of other matter; which may be proved to be of the ſame nature with that of the other parts of a Viper; and that 'tis ſo far from being able to work like poiſon, that 't is very proper and effectual to maſter all the ill accidents, which the bite of a Viper may cauſe; of which I do accuſe the enraged ſpirits alone. Since therefore Sign. *Redi* hath dried and laid aſide the yellow liquor of two hundred and fifty Vipers, and may eaſily obtain much more of it; 'tis in his power to extract ſuch a ſalt out of it, when he pleaſeth, to verifie

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what I was just now saying: And if, to save himself that labour, by reason of his other important occupations, he shall please to send me a competent quantity thereof, I do with all my heart offer my self to prepare it for him, thereby to let him see not only the innocence of this juyce, but also the great benefit, that is hid in it.

Concerning the *Bilious Breath* of a Viper, that may be charged to intervene with this yellow liquor, and to envenom it; I am of opinion, that that is nothing but a disguise of the enraged spirits. I assert, *That* the true Breath of a Viper is ever innocent, how bilious soever it be represented; *that* there issues not any ill scent out of her throat, nor out of her guts, nor from the parts made to void the excrements; *That* Vipers among other marks are in this different from Snakes, that *these* have their excrements and the parts containing them very fetide and of a smell of stinking Urine; whereas you cannot perceive any ill smell in any part of a Viper; *that* the Spirits which carry the venom are quite another thing than the breath coming from the Lungs; *that* those spirits have no union nor correspondence with the Bilious humour; *that* they are not formed but at the instant of the irritation; and lastly, *that* they need no such

ſuch thing as an excrementitious and uſeleſs liquor, pretended to intervene, fit for nothing but to gard the paſſage of the place, through which the vexed ſpirits have entred.

But the better to ſhew the impoſſibility of the intervention of this breath, and to make it appear, that it never contributes any thing to the poiſon; you may take notice, that a Vipers head cut off, ſeparate from the Lungs and all communication with the Gall, and incapable to yield any breath, and deprived even of all that yellow liquor; yet failes not to kill by its biting as long as 'tis alive, if the animal have been provoked; juſt as would come to paſs, if a bite were made by the head of a Viper that is whole and alive, if no remedy were applied.

Touching the Communication, that may alſo be pretended to be between the bladder of Gall and the yellow liquor, by reaſon of ſome reſemblance of colour; I ſay, that, beſides *that* my Sentiments in theſe matters are very conform to thoſe of Sign. *Redi*; *that* we have both of us juſtified the innocence of the juyce contained in the Bladder of Gall; *that* we have denied, there is any veſſel carrying this better juyce into the veſicles of the gums, to make that yellow liquor which is found there;

there: and lastly, *that* we have unaniniously contradicted the errors of the Antients about this pretended channel; besides this, I say, the truth of what we have affirmed is very easie to prove by tasting the yellow liquor of the Gall, which is very bitter and very sharp, though very innocent, and by comparing it with that of the vesicles of the Gums, which is very flat, though equally innocent. The same may be yet better made out by dissecting one or more Vipers; where, no more than in Serpents and all other animals, you will never find any vessel, that carries this bile of the Bladder of Gall to the Gums; and you will there see nothing but veins and arteries filled With true blood. Of this there will be no doubt, if you please only to taste it; for you will find nothing but the ordinary taste of blood. To be yet more assur'd of it, you may taste all that runs out of the body of a Viper when the head is sever'd from her; for you shall find no bitterness at all, nor other tast but that of blood. And besides, having amply verified, that the yellow liquor comes from the Salival glanduls alone, and having given a very exact description of them; I think it needless to say any more of it, what ever the Antients may have written, or the Moderns may say of that subject.

To

To come now to the *enraged Spirits* of a Viper, which I do assure to be the true and only seat of the poison; methinks Sign. *Redi* hath no reason to oppose my opinion, when I do interess in it the imagination of the Viper, or her *Idea* of revenge, for the formation of those Spirits. I might here alledge what *Van Helmont* saith in his Chapt. *De Tumulo Pestis*, viz. That not only the *Idea* and the Imagination of terror are formed in the inward *Archeus* of the person invaded by the Plague; but that the Toad, which hath, *as he saith*, a perpetual hatred against man, finding himself taken, and hanged by one of his hind-legs, and in a condition of dying, conceives an *Idea* and an imagination of terror by the sight of the man, that often presents himself before his eyes, and whom he looks upon as his capital enemy, and that the same *Idea* or the same phancy of terror, which the Toad hath conceived by this means, forms in him such impressions and qualities, as are permanent even after his death. Then this Author will, that of this body, that dyed in those *Ideas* of terror, mingled with the parts that have issued thence, and with the wax that shall have received them, you shall make Trocheſque's, which being taken inwardly, and carried about you, or applied, shall have the virtue

virtue of curing as well as preserving from the Plague, by mortifying by their Specifique quality the terror which the inward *Archeus* of the person may have conceived of this evil. Now since this Sentiment of *Van Helmont* hath found place in the minds of many men, very capable to judge of it; who have been thence induced even to make exactly that preparation of Toads, which he hath taught in the same *Chapter*, and which I can assure I have my self made to satisfie the desire of very able Physitians; having also known many persons giving great credit to it, and carrying continually about them of those Trocheſques whilst there was talk of the Plague; methinks, that the formation of the enraged spirits, which I ascribe to the *Idea* and imagination of revenge, conceived by the Viper when she is vexed, is incomparably more maintainable, and much easier to be comprehended, as well as the entry of the angred Spirits through the Openings made by the Teeth; because not only these Apertures are wont to be deep, but also because the teeth being hollow, serve for a Funnel to intromit those spirits, that accompany the biting, and that produce afterwards in the body bitten those dismal effects of vengeance, which the Viper had conceived when she felt

felt the ill done her ; And the letting in of those Spirits through the cavity of those teeth is so much the more easie, because there is also at the end of each great tooth a hole, which, though very small and almost undiscernable by the eye, may yet be discerned by a Microscope, & hath accordingly been lately seen in some publick Assemblies at *Paris*, in the presence even of persons very affectionate to Sign. *Redi*.

What shall we say of the imagination of Fright and Constraint, that a Toad also impresses in a *Weesel*, which having seen and been seen by that ugly animal, at a certain season of the year, and always in summer, can not avoyd to run a pretty while round about it making a continual shrill noyse, as if she cried for help, whilst the Toad remains moveless with his throat open ; and which after a long troublesome motion is constrain'd to come and render her self into that throat. The thing is too well known in divers places of *France* to doubt of it ; and I can assure to have heretofore seen it my self ; and that after I had well observ'd and withal wondred at the force of those *Idea's*, appearing in the agitation of the Weesel, and in her being constrained to fall into the mouth of the Toad,

I had the ſatisfaction to kill the Toad in that moment, and ſo to ſave the Weeſel, which quickly run away, finding her ſelf deliver'd by the death of the animal, which was followed by the extinction of thoſe *Ideas*, that before had had ſo much power over her. This effect cannot be adſcribed to the foam, nor to any material part of the Toad, ſince the Weeſel flyes from him naturally, and falls not into his mouth but in ſpight of her teeth. Beſides that the foam of the Toad, which the Weeſel failed not to meet with in his throat, can work nothing, ſeeing the Weeſel ſaved her ſelf immediately after the death of the animal. We therefore muſt needs ſeek for the cauſe of all theſe effects in the Spirits.

More-over, what will Sign. *Redi* ſay of a mad dog, which, in the pervertion of all his ſenſes and of all the ordinary functions of his body, breaths after nothing but miſchief, and makes it his buſineſs to reduce into the ſame miſerable condition all men he ſees, and even his own maſter, as well as all animals he can come near and bite? If then the mad Dog hath the power to make paſs the ſame *Idea's* and the ſame imagination, which have ſeized on him, into all the creatures

tures that he can come to bite, and into man himſelf, though of a very different ſoul and nature from his, by doing no more than with the edge of his teeth to touch the ſuperfice of the skin, and that through his cloaths that may retain and wipe off all the foam, adhering to the teeth, and lyable to be accuſed of having a hand in the miſchief; as is very well obſerv'd by *Van Helmont* in the ſame Chapter? If, I ſay, this dog hath the power of communicating his evil to all ſorts of animals, from one to another, without a limit, and without excepting any kind; Why ſhou d he think it incredible, *that* a Viper is able by her biting to carry her enraged ſpirits into the bodies of ſuch men and other animals as ſhe can light upon; *That* theſe ſpirits are capable to kill the animal bitten; and *that* they effect this by the perturbation and corruption, they introduce into the whole maſs of blood; foraſmuch as they do manifeſtly hinder its circulation, and the communication of the natural ſpirits, that were wont to be conveyed into all the parts? Conſidering withal, that they do not extend themſelves as far as thoſe of the bite of a mad Dog; ſeeing none of the Animals bitten by a Viper, have any venom diffuſible either by their biting,

or otherwiſe, as long as they live, and that they may be ſafely handled, and even without danger eaten after their death.

I ſay beſides, that if it be true, that a man, who hath at all times the ſame ſpitle and the ſame teeth, & who hath them not pointed nor ſhaped like thoſe of a Viper, is capable to introduce the Gangrene, and to cauſe death it ſelf by a bite made by him in a rage; whereas another and longer bite, made by the ſame man not enraged, is not accompanied with any ill accident, and is healed like a ſimple wound; This being true, I ſay, we ought to think it neither ſtrange nor impoſſible, that a Viper, which hath long and piercing teeth, and which ſhews the force of her being vexed by the nimbleneſs of her biting, ſhould be able, by biting when enraged, to make animals feel the mortal effects of her vexed ſpirits.

What ſhall we ſay of the pricking of a *Tarantula* how ſlight ſoever? ſhall we declare it to be exempt from the *idea* and imagination of this little animal, ſince it impreſſes it ſo ſtrongly and differently upon perſons that have been pricked therewith, inſomuch that it perverts in part the ſenſes and ſpirits, conforms them to his ſtirring and skipping nature,

nature, and constrains them at certain and set times to continual dancing for several days, and which having left a contumacious leaven of the same *idea's*, faileth not to produce the same effects every year, and, if you may believe Authors, as long as the *Tarantula* liveth, and until the same *idea's* be extinct by its death. And though I doubt not but that Sign. *Redi* hath seen very many examples of persons pricked by *Tarantula's*, there being store of them in *Italy*; yet I shall not forbear here to recite that of a *Neapolitan* Souldier, who hath been these four years among the *French* infantry. This Souldier, whom his Camarads call'd *Tarante*, because he had been pricked by a *Tarantula*, is still to this very day in the Royal Regiment of *Roussillon*. He never failed to feel every year at a determinate time (*viz.* about the 24*th* of *July*) the effects of that sting, which he had receiv'd before he came into *France*. He was always sure of the time about two or three days near it. And when the *ideas* of the sting were found exalted to a degree capable to produce their effects, he began to dance, and desired to hear without interruption the Violins, which the Officers of that Regiment caused to be play'd for him out of charity; to

which he answer'd continually, keeping time very well, without being tired, for three days, eating and drinking, without interruption of his dance; and being very impatient of any discontinuance of the play of the Violins, and that the more, if the intermission was any thing long; for then he became altogether livid, and fell into grievous swoundings. He pleased himself whilst he danced, to have in his hands several naked swords, one afer another; to see about him many Looking-glasses, to behold himself in them dancing; to be environed with much people, and, that he might hinder them from going away, to take from them their Gloves, Ribbons, and such other things; being very careful to keep all he had taken from them unto the fourth day, which being come, his eagerness to dance abated, and at length quite ceased; he remembring all he had done, and knowing all that were about him, to every one of whom he rendred very exactly and without any mistake all he had taken from them, though he had to do with a thousand people. After which time, he pass'd the remainder of that year, and the whole interval of his Paroxysmes without any inclination to dance. He was naturally melancholick,

in

in appearance of no great parts, neither had he learn'd to dance. He hath been ſeen thus dancing every year by thouſands of people, and particularly in the Camp Royal *Anno* 1670. where the King himſelf and the whole Court ſaw him. And this hath been ſo beneficial to him, that the ordinary time is paſt this year without any aſſault of this evil, which he had great apprehenſions of, finding himſelf at that time engaged in a march, and fearing he ſhould want Violins at the time that the fit ſhould take him.

Now ſince the pricking of this Animal, though very ſmall, and in a manner like that of a ſmall fly, being made even thorough ſtockings or cloaths, is able to act equally upon the body and the mind of the perſon ſtung; as leaving behind ſuch long and ſtrong impreſſions, and cauſing ſuch irkſome returns; To what can we adſcribe all thoſe different effects, if it be not to the *idea* or imagination of the animal ſtinging, or of the perſon ſtung. 'Tis needleſs, to alledge here the effects of the *idea* or imagination of Women with Child, nor of that of *Jacob's* Sheep. I think I have ſaid enough to juſtifie the poſſibility of the *idea* or imagination of a Vipers revengefulneſs, for the forming

ming of angry ſpirits, ſufficient to impute unto them all the venom, and to exclude from it the yellow liquor.

After this, Sign. *Redi* muſt not wonder, if I, *who* make profeſſion of Chymiſtry, (of which I have the honour to read publick Lectures in the Garden Royal) *who* doe every day exerciſe my ſelf in ſeparating the ſpirituous parts from the groſs ones in mixt inanimat bodies; and *who* have not been able to find in any corporeal and ſenſible matter the true cauſe of the ſtrange and ſuddain productions, obſerved in the biting of a live Viper; If I, after all this, I ſay, have thought my ſelf obliged to ſeek for it in the *Spirits*; if having found it there, I have abandon'd his party, and communicated to the publick the diſcovery I have made.

Yet I am not over-much ſurpriſed, that Sign, *Redi*, being in this matter prepoſſeſs'd by corporeal groſs things, ſtill perſiſts in his ſentiment, ſince in the preparations, that do altogether depend of my profeſſion, and which I ought to know well, he rejects ſpirituous ſubſtances, which he reliſhes not, ſticking only to the more material, which are the leaſt, and in very ſmall quantity; which doth not keep him from believing them

them to be the beſt. You may ſee, what he writeth of it about the end of *pag.* 76. and at the beginning of *pag.* 77, of his firſt Letter of Obſervations, in theſe words.

In queſte nuè naturali Oſſervationi ho conſumato gran quantitá, &c. That is, *In theſe my natural Obſervations I have ſpent a great quantity of Vipers, making of them daily a very great ſlaughter; and, to extract the ſubtile from the ſubtil (if I may ſo ſpeak) I always laid aſide and kept all their fleſh and bones, which being dryed in a Furnace, and afterwards by a quick fire with long and great labour burnt and reduced to aſhes, I thence drew the Salt with Fountain-water, and purified it, and reduced it into a kind of Chryſtal,* &c.

Thoſe that know all the parts of which the body of a Viper is compoſed, will certainly wonder, that a perſon ſo judicious and knowing hath not found, that the chief and beſt part of a Viper conſiſts in its volatil Salt, and that that Salt would not fail to avolate and to be waſted by that preparation or rather deſtruction, which Sign. *Redi* hath uſed to extract the Salt of Vipers. They will quickly ſee, that when he would draw the ſubtil from the ſubtil (as he ſpeaks) he did quite

quite the contrary, and expelled and diſſipated the volatil and better parts, returning only the groſs, the fixed and the leaſt. They will ſoon judg, that he ſhould not have given himſelf all that labour and pain, which he ſaith he hath taken, to ſucceed ſo ill in his work; and that he had done much better, with ſilence to paſs over his proceſs, then to publiſh it. The way, by him taken, will be found, I think, received from the Antients, who knew not, that all Animals abound in *Volatil*, and have little of *Fixed* Salt: And his preparation, which is very eaſie, would have pleaſed better in thoſe times, eſpecially in *Italy*, then that great and laborious Preparation of the Salt of Vipers, which was made with ſo great an *Apparatus*, and of which I have already given my thoughts, when I diſcourſed of the Remedies drawn from Vipers.

I alſo foreſee, that Sign. *Redi* will not receive any greater advantage by ſtriving to attribute to himſelf the firſt diſcovery of the *Salival glanduls*, which I found on both the Temples of both Male and Female Vipers, and which I have deſcribed and delineated in my Anatomy of Vipers: For, he will not be able to perſwade it to thoſe, who ſhall

ſee

ſee *pag.* 44. of his firſt Letter of Obſervations the diſcourſe following;

Se non ſtimaſſi vergogna ſcriver ſenza altra riprova, &c. That is, *If I did not think it a ſhame, to write, without other proof, what came into my phancy, I might ſay perhaps, that that yellow liquor is by no other way intromitted into the aboveſaid gums of the teeth but by thoſe* Salival Conduits, *found out by the famous* Thomas Wharton, *and ſhewn in this Court by* Lorenzo Billini, *a learned young man and of great expectation, in other Animals beſides Man, and particularly in Staggs, and Wood-peckers: Moreover that under thoſe Gums there are two ſmall Glanduls, found by me in all Vipers. Yet I would not have you rely upon this thought of mine, becauſe it may prove a Chimera, as I believe it to be one,* &c.

I cannot comprehend, how Sign. *Redi*, after he hath ſpoken of the *Salival Conduits* as of a thing that came into his phancy, and by a *perhaps*, that is to ſay, not knowing it; and who declareth, that he was aſham'd to write of a thing without verifying it; who exhorts his friend to whom he writes, not to relye on his thoughts, and who adds, that it may prove a Chimera; I know not, I ſay, how,

how, after he hath written all this, he can pretend to be the inventor of the *Salival Glanduls* and their Pipes: For *pag.* 55 and 56. of his firſt Letter ſpeaking of the yellow liquor, he adds,

E queſto veleno altro non è, &c. That is, *This venom is nothing elſe but that liquor, which humects the Palat, and ſtagnates in thoſe gums that inveſt the teeth, not transmitted thither from the Bladder of Gall, but bred in the whole head, and conveyed* perhaps *to the gums by ſome Salival conduits, which* perhaps *are there inſerted.*

Where the word *perhaps*, yet twice again repeated, doth ſufficiently ſhew, that Sign. *Redi* did ſpeak of the *Salival conduits* no otherwiſe than as of a thing he was not at all aſſured of. And though he may ſay, *that* he hath had thoughts of it ſooner than I, (who have not medled with Vipers but ſome years after his firſt Letter,) *that* what he had written of it gave me from that time occaſion and a deſire to ſeek for thoſe Pipes and the Glanduls that might convey thither the yellow liquor; *that* the belief, he had of the Generation of this juyce in the whole head, induced me to ſearch for the Salival Glanduls higher and farther off than the place *under* the bottom

bottom of the veſicles; and *that* I doubt not, that himſelf might have found theſe true Glanduls, if he would have taken pains for it. I anſwer, that, ſince he hath *not* done it, he ought not to be offended at my having labour'd for him, and ſucceeded in ſo doing: Neither hath he any right to deny, that I have firſt found, deſcribed, and to the life, repreſented the two heaps of Salival Glanduls of a Viper with all their Veſſels, as well for forming, as conveying the yellow liquor into the Veſicles that cover the great teeth.

As to what Sign. *Redi* ſaith of me, ſpeaking of the Authors of my Book, that I have changed the words, *under the bottom*, into thoſe, *at the bottom* of the veſicles of the gums, and there ſought in vain for the two ſmall Glanduls, which he aſſures to have found there in all Vipers: I anſwer, that whilſt he is critical as to the letter of the words, *I* keep to the truth of the matter of fact: And I can aſſure, to have ſearched with much care, not only *in* the whole bottom of the veſicles, but every where *under* the bottom of them, but have not found any, whether great or ſmall Glanduls, nor any thing of the colour of a Glandul, nor that came any way near to their form.

I put it then for a truth, that there is not to be found any Glandul neither *in* nor *under* the bottom of the veſicles, and that *under* the bottom there is nothing but *the* griſtly bone that gives the ſhape to the noſe of a Viper; *the* two ſharp ends of the two advanced bones of the skull, to which the two great teeth are firmly annexed; *the* conduit of the ſmell, *that* of the hearing; ſome ſmall vein, ſome little Artery, ſome little Nerve, the extremity of a Muſcle, and the two ends of the Salival Channels that diſcharge into the veſicles; as you may ſee it in a manner deſcribed in the Anatomy made of it by me.

After this, Signor *Redi* himſelf ſhews, that it was impoſſible, there ſhould be Glanduls *under* the bottom of the veſicles, ſince he ſaith, *pag.* 38. of his laſt Letter.

Ne io poteva mai ſcrivere, &c. that is, *Nor could I at all write, that thoſe Glanduls lay in the bottom of the veſicles, if I was of opinion, that the yellow liquor did run into them after it had paſſed through the Salival conduits, which yet I imagined might have their Origin from or connexion with thoſe two Glanduls ſeen by me, and therefore muſt needs be in a ſituation a little diſtant from the veſicles, and not in the bottom of them.*

For

For ſince he ſaith, to have meant, that the yellow juyce took its courſe thorough the Salival conduits before its coming into the veſicles; He cannot find a way long enough, nor a diſtance great enough, for the need of long conduits, from the place *under* the bottom unto that which is in the bottom of the veſicles: For, there would have needed nothing but a little opening in the ſame bottom, to receive the juyce iſſuing out of the two little Glanduls he hath ſpoken of. And he ſhews ſufficiently, that he cannot maintain thoſe two ſmall Glanduls *under* the bottom, where he would have them to be, ſince now he will needs have them a little diſtant from the veſicles, that he may find, in the intervall, a ſpace ſufficient for the veſſels that are neceſſary to the courſe of this yellow liquor. Beſides, that it is altogether impoſſible for two ſmall Glanduls to furniſh all that yellow liquor, which preſents it ſelf in the veſicles; ſince the two great heaps by me found in the two Temples and behind the Orbits of the eyes of a Viper, can hardly furniſh each about a drop in the ſpace of 24 hours, after the veſicles have been well voided. Moreover, it is very eaſie to judge by what *Sign. Redi* ſaith in his Firſt Letter, that he underſtood not, the Salival Glands were ſeated, as they

they are, on the two Temples, nor ſo near the skull; ſince he ſaith, that what came into his phancy, was, that the head of a Viper did not convey that yellow juyce but by certain ſalival conduits. For if he had been of another mind, he would not have ſpoken but of glands; or, at leaſt, he would have begun with them before he had ſpoken of the conduits, which ſhews alſo ſufficiently, that by this means he hath as 'twere inverted the order of nature: For, inſtead of placing the Glands cloſe to the skul, and afterwards the ſalival conduits; he hath begun with theſe, and would have them immediately to receive the juyce of the Brain, and to carry them to the veſicles of the gums; and that his two pretended glanduls are ſeated between the extremity of theſe conduits, and the bottom of the veſicles; though none be there, and it would be altogether uſeleſs, they ſhould be there, becauſe there are none but they that can at the beginning ſuck & digeſt the humidities of the brain and the neighbouring parts, and ſend them into the veſicles of the gums by the conduits appointed for this office.

But when Sign. *Redi* accuſes me of having taken the bottom of the veſicles for that which is *under* the bottom of them, and of not having rightly underſtood, as he ſpeaks,

hath

the *Toſcan* tongue; I may ſay, that himſelf hath not very well apprehended, nor duly explained the *French* terms, uſed by me; ſince he ſaith at the end of *pag.* 35. and at the beginning of *p.* 36. of the ſame laſt letter.

Sovra de chi gli, Autori delle novelle experience affermano, &c. That is, Whereupon the Authors of the New Experiments do affirm, that they could never ſee ſuch Glanduls as I had named; but that inſtead of them they had found two others, which they call Salival, thus by them deſcribed, *p.* 31.

For neither in all that he hath afterwards taken the pains to tranſcribe out of my book on that ſubject, nor in all the reſt of my *Section* upon the Salival Glanduls, he can have read, that I ſay to have found *two Glanduls*, but, *Glanduls*; there being a great difference in good French, between *Deux Glandes*, and *Des Glandes*, *two Glands*, and, *Glands*. And when, deſcribing the Glanduls, I ſay, that they are ſeated on the two ſides of the *Cranium*, I ſay afterwards, that there are many ſmall ones joyned together, which may be call'd *Conglomerate Glanduls*. And yet more; I ſpeak of an *Heap of Glanduls*; ſo far am I from ſpeaking only of one or two Glanduls, as Sign. *Redi* hath repreſented me to have done.

And ſince, in hopes of better maintaining

his cauſe, he hath given himſelf the trouble of copying word for word, in his laſt Letter, only the moſt general place of my Book, and that which was the leaſt contrary to it, in my *Section* of the Salival Glands. To ſhew therefore on my part, that the Glands, found by me, are very different, and that even they are quite another thing, than the two ſmall ones ſpoken of by him; I thought my ſelf obliged to tranſcribe hither out of my book what he thought not neceſſary for him. For in the ſame *Section*, *p.* 30. (in the Engliſh verſion, *p.* 33) I ſpeak thus of the ſalival Glands.

Theſe Glands are found in all the heads of Vipers, both Males and Females; they are ſeated on both ſides, and joining to the skull, in the hind-part of each round of the eyes, and at the ſame height with them. There are many ſmall ones joined together, which may be call'd Conglomerate Glands, *that are eaſily diſtinguiſhable by their form and colour, which is different from the Muſcles, neighbouring to them, and of which there is one, that may be call'd* Temporal, *which in part covers them by its extremity. This heap of Glands appears there of the bigneſs of the neighbouring eye, and extending it ſelf in length, continues its progreſs in the Orbite of the eye, below and in part behind the eye. Each Gland hath its little Lymphatique veſſel,*

which

which parts from it as from a little Teat, and goes diſgorging it ſelf into a greater veſſel, that runs all along and under theſe Glands, and paſſeth into the Veſicle of the Gum, and terminates in the midſt of the Articulation, which the root of the great teeth makes with the advancing corner of the ſaid Orbite, and with the little Bone, which by its other end is articulated in the middle of the upper jaw. This principal veſſel, which being conſider'd alone, is very little in appearance, but is not ſo in effect, ſeeing it receives the diſcharge of all the ſmall veſſels that come from each Gland, empties it ſelf into the bag of the gums, and carries thither that Salival *juyce, which may have qualities approaching to thoſe of the* Saliva *or Spitle of man, or of the foam or drivel of divers other Animals.*

The Nerve, which ſerves in the Noſtrils to the faculty of Hearing, *runs for ſome ſpace along theſe Glands, which are alſo, as I have already ſaid, ſmall Veins and Arteries.*

But having well conſider'd the ſubſtance, quality & ſcituation of theſe Glands, *we judged their formation not to be in vain; but that their Uſe, in all likelyhood, was, to receive the humidities both of the Brain, the Eyes, and the neighbouring parts; and that their diſcharge was very convenient, and even very*

neceſſary to the parts, which receive that liquor; as well for moiſtening the ligaments of the great teeth, and to keep them in a condition of bending at ſuch time when the Viper will bite, as for bedewing and increaſing the teeth, which Nature hath formed and ſet in the midſt of this Juice.

For the reſt, examining and taſting the Glands as well as the Juice, we found a taſte altogether like that of the Gums, which Sign. Redi *hath deſcribed; namely, very near the taſte of the Oyle of Almonds, without all bitterneſs, though it leave, a while after, a little acrimony in the mouth, ſuch as may be diſcern'd in all kind of Spittle.*

I could add here, what I ſaid of the Salival Glands of *Snakes*, their difference from thoſe of Vipers; and I could alledge, that I believe my ſelf to be likewiſe the firſt Diſcoverer of them. But becauſe ſo prolix a Citation might prove tedious, and that thoſe that deſire to have more light therein, may eaſily find the reſt in the above-cited *Section* of my Book, I ſhall not tranſcribe it hither.

Mean time 'tis very eaſie to judge from my whole Diſcourſe, and from the exact Deſcription, made by me, of theſe *Glands*, and

and their neighbouring parts, that they were not known to me by *Phancy*. Their ſcituation very diſtant from that place *under*, and even from the ſides of, the *bottom* of the veſicles of the gums, ſhews ſufficiently, that they are neither *in* nor *under* the bottom of thoſe veſicles, as Sign. *Redi* hath pretended; and their great number makes it appear, that 'tis quite another thing, than the two litle Glanduls he ſpeaks of, and which are not to be found neither.

I intreat the Reader, well to conſider thoſe I have diſcover'd, as they are repreſented in my *third Cutt*, as well in that part where the Temples are of a Head cut, mark'd C, (where their ſhape and ſcituation is repreſented to the life, as they ſhew themſelves before they are ſever'd;) as in the incloſure of a Vipers ſceleton, which is there alſo exhibited; where he may ſee them in their upper and lower appearance, drawn out of the Head, and by their ligaments faſtned to the hind-part of the Eyes, and to the body of the Brain. I came not to the full knowledge of them till after much pains, and a very long and particular ſearch. I did not content my ſelf to ſeek a great while in the bottom,

and under the bottom of the veſicles of the gums; but, to find theſe Glands, I have ſlead and diſſected a great number of Vipers heads, as dextrouſly and nicely as I could; and I have uſed all means well to examine them; among others, I cauſed many heads to be gently boyled in a little water, *as well* to conſider the divers futures of the skull, and to ſeparate all the parts from it; *as* to remark well the form and the connexion of theſe Glands, to draw them out whole, and joined, as they are, to the Eyes, and to divers bodies of the Brain, to which the marrow of the Spine is annex'd; and to have all theſe parts entire, and ſuch as I have cauſed them to be engraven.

Me thinks, that all theſe cares, follow'd by ſo good ſucceſs, may well deſerve, my Diſcovery of this great number of Salival Glands with all their veſſels, ſhould not be envied me by Sign. *Redi*; conſidering I do ſufficiently appear to him incapable of envying him any of thoſe fine things, he hath already found, or may find hereafter in his curious re-ſearches.

There remains no more for me to do, me thinks, than to ſatisfie Sign. *Redi* as well concerning the Uncertainty, wherein he is touching

touching the Power of the Volatil Salt of Vipers for the curing of their bitings; as about the Objections, by him made againſt my Experiments of the Head and Neck of a Viper, for curing Doggs bitten by it, and which I have alſo thought ſhould be efficacious to cure men in the like caſe.

He oppoſes nothing to the Vertue of this Volatil Salt, but that he remits the Reader to the time he will take, Chymically to prepare this Salt, and to make the Experiment therewith. But he ſaith, that he hath made many tryals with the Heads and Necks of Vipers, and found firſt; That, having made two great Doggs aforehand to ſwallow, each the head and neck of a Viper, and, afterwards cauſed both of them to be bitten by other Vipers, thoſe Doggs dyed not: And that, having cauſed to be bitten two other Doggs of the ſame bigneſs, that had eaten neither head nor neck of a Viper, they dyed neither. He ſaith further, that having made a Pullet to ſwallow one head of a Viper, and a Capon two, and cauſed them to be bitten, they both dyed ſoon after. He adds, *that* having the next day made ready ſome heads of Vipers, he cauſed them to be forc'd down the throat of two little Doggs, of which he cauſed

the leaſt to be bitten in the legg near the *anus*, and the other, in the tongue, and that they both dyed; *That* he made the ſame Experiment upon eight Pullets, two Kitlings, two ſmall Rabbets, and ſix Pigeons, even with rubbing the place bitten with the blood of the Viper; *That* alſo the ſix Pigeons were bitten by the heads of Vipers, dead ſeveral dayes before, and that all theſe animals dyed; *That* laſtly, he had fed two Pigeons for three dayes with the fleſh and broath of Vipers, and being bitten thereupon, they dyed likewiſe, this aid notwithſtanding.

For Anſwer to all theſe Experiments, I make uſe of the ſame *Generals*, that Sign. *Redi* hath done againſt mine, which are to be found *pag.* 16. of his laſt Letter; where he ſaith: *That* a Viper more eaſily kills leſſer Animals by his biting, than great ones; that, according to the bigneſs of the Animal bitten, and according as the place wounded is more or leſs provided with veins or arteries; that, if from the wound of a Viper much blood iſſueth, the Animal not only dyeth not, but does not ſo much as feel any great inconvenience; that it alſo falls out ſometimes, that the Animal bitten eſcapeth, after it hath endured many

ny mortal ſymptoms; and that this may come to paſs by the ſole aſſiſtance of Nature.

As to the two other *Generals*, which he alledgeth in reference to the letting in of the yellow liquor; I did not think fit to alledge them here, *both* becauſe I agree not as to the poſſibility of the fact, *and* that I have elſewhere declared my ſelf ſufficiently about it; as alſo that they make not to this purpoſe. But I think it more material, to add here two other *Generals* to thoſe of Sign. *Redi*, and to ſay: That the biting is more or leſs noxious, not only according to the place bitten, but according to the degree of the Vipers being vexed when ſhe is to bite, and according as her teeth have more or leſs penetrated. And reaſoning particularly upon theſe experiments, I ſay, *that* the dogs which I had cauſed to be bitten every one thrice, & were cured by making each of them ſwallow the head and neck of a Viper, were of a very midling ſize, *that* it is very difficult to found a certain judgment upon the great ones, which Sign. *Redi* hath uſed, as 'tis alſo, to paſs it upon them that had ſwallow'd the head and neck of a Viper, and thoſe, that had not done ſo, *that* all the other little animals, which he employed, as well the Pullet and the Capon, as the Pigeons, Catlings, Puppies, and little Rabbets,

Rabbets, had not of themſelves ſtrength enough to reſiſt for a time the enraged ſpirits, nor to find the effect of the remedy; eſpecially that which was bitten in the tongue. For, I firmly believe, that there is no animal, great or ſmal, which being fiercely bit in the tongue by a Viper well vexed, can avoid death, what aid ſoever you miniſter to it, becauſe of the nerves, veins & arteries, diſſeminated through the tongue; and becauſe that the angred ſpirits finding a free entrance, produce there all the effect they are capable of, with ſo much violence and nimblenefs, that nothing is able to ſtop them. But in all curable bites I ſhall not eaſily be induced to renounce the help, which may be given by the head, neck, heart, liver, and divers other parts of a Viper (eſpecially of her that made the bite) for the cure of the animals that have ſufficient ſtrength to reſiſt a while, and to expect the benefit of this kind of remedy. I believe alſo to have great cauſe not to exclude from it man himſelf; as alſo to prefer the parts of the ſame Viper that hath bitten, to thoſe of others; becauſe they muſt needs have greater cognation and more conſent with the vexed ſpirits, that iſſued from her. Concerning which I think it not amiſs, to impart to the publick an accident that hapn'd in the Royal Laboratory of this City, whilſt my laſt experiments were making.

A young man that had made a good progreſs in his ſtudies, deſirous to perfect himſelf in both ways of Pharmacy, and chiefly addicted to my courſe of Chymiſtry, was near me, in the midſt of a great Aſſembly, on the 2*d* day of my experiments. After I had made ſome, whilſt I was entertaining the company, the fancy took him, in imitation of me, yet without my knowledge, to take a Viper with his hand, and to ſeize on her head: which he did not with that caution that is neceſſary, as not holding her ſo faſt but that the Viper took her opportunity, and ſtruck one of her great teeth very deep into the middle of the upper part of his left fore-finger. Having been made acquainted therewith, I remov'd, as much as I could, all fear from his ſpirit, and adviſed him to betake himſelf to the neceſſary remedies. The credit he gave to the truths contain'd in my book, often read by him, induced him to ſay, that if I thought well of it, he would eat the head and neck of the Viper that had bit him. Commending his courage, I ſeconded his good inclinations; for, I cauſed ſlightly to be broiled on coals the head and neck of the ſaid viper, and made him eat and ſwallow it hot, in the midſt of the company, adding to it the heart and liver broiled likewiſe. After which I ſaid, I doubted not but what he had done would be ſufficient to cure him; yet to be the

ſurer

ſurer, I would give him ſome volatil ſalt of vipers, eſpecially he being a perſon whom I did much eſteem, and for whoſe health I had and ever ſhould haue a great concern. I thereupon immediately gave him a doſe of fifty grains of this volatil ſalt, diſſolved in four ounces of water, and aſſured him there was not any danger after this. The young man remained in the midſt of the company, & ſtirr'd not from the place, till the meeting ended, and then he took a little freſh air. He was afterwards a couple of hours in the Royal Garden and the Laboratory; during which time he now & then found ſome little ſickneſs about his heart; but being come to his own lodging, he was ready to ſup as he was uſed to do, and would have done it, if I had not thought it better for him to take another doſe of the ſame volatil ſalt, which had ſo good effect, that the next day, after he had dined well, he came again to our meeting; which did much ſurpriſe all thoſe that had been witneſſes of the bite. Since that time he hath ever been very well. Now though his wound appear'd much deeper then that of the German gentleman, that was bitten the 1*ſt* day of my former experiments; yet had he none of thoſe grievous accidents, that befell *him*, & were by me deſcribed in my book: for he had no other pain but that of the hole of the bite, nor had he ſo much as a Fever. The wound

only

only rendred ſome drops of blood, by means of the ligature, I caus'd to be made on the top of his wounded finger, which did never ſwell, and heal'd up as if it had been made by the prick of a pin, without any Cicatrice appearing; ſo far was it from a Gangrene, or Scar, as ſome fancied he would have.

The thing hath been too publick, not to be credited every where; and I think not, that Sign. *Redi* himſelf will doubt of it; but rather that all things have concurr'd together to verifie all I had advanced in my book, of which he hath conteſted ſome particulars, and could not reſolve himſelf about others. However, if he have by him any remedies, more quick and more ſure for the cure of the bites of Vipers, the publick will be much oblig'd to him when he ſhall pleaſe to impart them, as I very willingly communicate theſe I have experimented. I ſhall not ſpeak here of divers Experiments lately made upon Vipers by very able perſons at *Paris*, which confirm not only the perfect innocence of the jellow liquor that is in the veſicles of the Gums, but which warrant at the ſame time my adſcribing the venom to the enraged ſpirits. Theſe truths will be better received from their hands, and they will be much more advantagious to me, than if I did attempt to publiſh them now. For doubtleſs there will be found in them very

ry curious things, and they are like to be of more importance than what I might be able to ſay of them. Beſides that I am far from uſurping the honor due to others, and from attributing to me the obligation, which the publick will owe them for it.

For a concluſion of this diſcourſe; *ſince* Sign. *Redi* hath not found in the whole body of a Viper any other part but the jellow juice to which he can aſſign its venom; *ſince on my part* by the new experiments, he hath deſir'd of me, I have ſufficiently juſtified the innocence of the jellow liquor in the Vipers of *France*, and the great conformities, there muſt needs be in the ſame with that of the Vipers of *Italy*, aſſerting withal the venomonſneſs of the angred ſpirits cauſing the death that enſueth the bite; and *ſince* laſtly the Vipers of *France* do kill as ſoon and in the ſame manner as thoſe of *Italy* do, and even without any intervention of the jellow liquor: Theſe things being ſo, I eſteem, that Sign. *Redi* would do very well, if, to ſatisfie *on his part* the expectation of the publick, and without adhering any longer to the jellow liquor, which is ſo reaſonably conteſted, he would take the pains to labour to find out ſome new ſubject, that might be common to the Vipers of *France* and thoſe of *Italy*; that might have the ſame diſpoſition of matter, and the ſame power

power of acting nimbly; and that might with reaſon be equally declared the true ſeat of their venom; to the end that afterwards he might as juſtly exclude from it the enraged ſpirits, as I now exclude from it the jellow liquor. But if on the contrary it comes to paſs, that he can find none other, I believe not, that for the future he hath any ground to maintain his opinion, no more than to conteſt mine.

Concluding this diſſertation I ſhall ſay, that the contrariety of opinions, which is between Sign. *Redi* and me, in the moſt eſſential things of the Vipers poiſon, may alſo be obſerved upon another account about the ſame animal: For, the more *he* expreſſeth *p.* 39. of his laſt letter, the averſion and hatred he hath againſt it, the more I eſteem it, and the greater pleaſure I take to handle, to examine, and to prepare it. Nor can I ſufficiently praiſe the excellent qualities, which ſo rare a ſubject poſſeſſeth, nor the admirable remedies which it furniſheth: Which are the conſiderations, that have heretofore induced me, and oblige me ſtill to call the Viper one of the chief Pillars of Phyſick.

It may be, that for this once Sign. *Redi* will not doubt but that a diſcourſe as rude as this, compos'd among coals and furnaces, which I have ſeldom quitted of late, is mine. He will doubtleſs judge, that, if more underſtanding men had put their hands to it, the reaſonings thereof would

would be more ſubtile, the ſtyle more polite, and the expreſſions more elegant; and the *Greek* and *Latin* quotations would not have been ſpared therein, both to ſtrengthen the arguments thereof, and to adorn & enlarge the volume. But for all the contrarieties, which the different conceptions have bred between Sign. *Redi* and me, I ſhall always have a very great and a very diſinterreſſ'd eſteem for him; and ſo much the more, becauſe I have great reaſon to conceive ſome good opinion of my book, ſince it could deſerve that ſo intelligent & famous a perſon hath vouchſafed to read it again and again with pleaſure, as he ſaith himſelf, that he hath taken the pains of tranſcribing many pages out of it word for word, and hath made it famous by his anſwer, and by that alſo which a perſon of great parts, and a high reputation hath made to it, addreſs'd to himſelf on this ſubject. I cannot but much glory in it, and highly declare my ſelf his obliged. And if it ſhould come to paſs, that the diverſity of his experiments, the force of his arguments, or the eſteem he hath acquired among the Learned, ſhould carry the bell from me in the ſpirits of all the world; the victory, which he ſhould thence obtain, would not be much leſs advantagious for me, then if the truth of my experiments, accompanied by my reaſonings, had been able to ballance or even to prevail over his Sentiments and the writings of ſo Illuſtrious a Perſon.

FINIS.

BRITISH MUSEUM

ERRATA.

PAg. 8. l. 24. r. 109. for *cog.* p. 12. l. 27. r. *of a clear.* p. 29. l. 14. r. *Glandular.* ib. l. 19. r. *Seeing* for, *I seeing.* p. 30. l. 18. r. *with Vipers have made.* p. 31. l. 14. r. *read then.* p. 63. l. 26. r. *the Yellow.* p. 66. l. 18. del. *to.* p. 77. l. penult. r. *this bitter.* p. 82. l. 19. r. *perversion.* p. 89. l. 6. r. *queste mie.* p. 90. l. 3. r. *retaining only.* p. 91. l. 11. r. *Bellini.*